ESTIMATION OF AVERAGE WEIGHT AND BIOMASS OF

PINK, CHUM, SOCKEYE AND COHO SALMON IN

SOUTHEAST ALASKA COMMERCIAL HARVESTS

By

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and

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ABSTRACT

The numbers of Pacific salmon (*Oncorhynchus*) landed in commercial catches in Alaska have been reported since the start of the commercial salmon fishery, but before 1958 landed biomass was estimated by assuming an average weight for each species. We estimated landed biomass from information available on the weight of various products (canned, fresh, frozen, etc.). Factors to convert product weight to round fish weight were obtained from the literature and from regressions, and landed biomass was estimated by the sum of the estimated round weights among product categories. Average fish weight was then estimated by dividing estimated catch biomass by estimated catch in numbers. We applied this method to pink, chum, sockeye, and coho salmon in Southeast Alaska and compared our estimates of average weight with published values from a variety of sources. Our estimates of average weight reflect annual variability unlike estimates published before 1958, but outliers were found in the recent product data. Nevertheless, average weights estimated by the product method are in general agreement with published estimates and provide a long time series of values that were derived from a single approach. We recommend that the best estimates of average weight in the catch are from our approach prior to 1958 and from published estimates derived from direct sampling after 1958.

KEY WORDS: Pacific salmon (pink, chum, sockeye, coho), average weight, catch biomass, product weights, round-to-product conversion, Southeast Alaska

INTRODUCTION

Long-term changes in the average weight or size of fish harvested in a commercial fishery are of particular interest in the study of fish populations. Temporal changes in average weight at comparable ages may reflect fishery-induced factors such as selection for large or small fish by the fishery (Ricker 1981), density-dependent growth which occurs during lacustrine residence (Eggers and Rogers *In press*), competition for food on the high seas (Davidson and Vaughan 1941; Larkin 1975), or responses to other oceanic conditions (Healey 1986). The variations of average salmon weight over the history of Alaskan fisheries are not easily discerned, because indices (such as the number of fish per case) employed before 1958 are difficult to relate to sampling data reported since then. In addition fish-per-case data, at least for Southeast Alaska, is largely only available for pink salmon (*O. gorbuscha*).

The purpose of this investigation was to estimate the catch (landed numbers or weight) biomasses and average weights of four species of Pacific salmon (*Oncorhynchus*) using Southeast Alaska product for years prior to the beginning of sampling studies in 1958.

DATA BASE OVERVIEW

Records of commercial salmon catches in Southeast Alaska begin in 1878 when the first canneries in Alaska were built at Redoubt, Old Sitka, and at Klawak (Moser 1899). In 1903 the Bureau of Fisheries (USBF) was established to manage Alaska Fisheries. Their reporting began in 1904 (USBF 1904-1910) and continued in an unbroken series (USBF 1911-1939; USFWS 1940-1957) referred to as *Alaska Fisheries and Fur-seal Industries* until 1959 (USFWS reports for 1958-1959 are unpublished). These reports consist of commentary and tables documenting the estimates of catch in numbers and weights of products marketed by each region in Alaska. For Southeast Alaska (the narrow strip of mainland and adjacent islands, from Portland Canal northwestward to and including Yakutat Bay) estimated numbers of fish caught were reported from 1906 to 1959 and the weight of products marketed were reported in a consistent format from 1911 to 1959.

The catch data prior to 1927 were reviewed in great detail by W. Rich and E. Ball (1933). Starting in 1927, estimates of commercial catch biomass landed in Southeast Alaska were reported annually (USBF 1927-1939; USFWS 1940-1959) in the statistical synopses *Alaska Fisheries*, but until 1958 published estimates were derived by multiplying the numbers of fish landed times a

statewide "average" weight thought to be representative for each species (USFWS 1958). This statewide "average" was usually not changed from year to year and was thus used to rather arbitrarily estimate landed biomass from catches in numbers. The sources for the data contained in *Alaska Fisheries* were the annual reports authored by the agent, warden, biologist, or supervisor in charge of the fishing district (unpublished - a collection exists at the NOAA-NMFS Auke Bay Laboratory, Auke Bay, Alaska). Between 1945 and 1957 the annual reports usually reported a number of fish required to pack 48-lb cases of canned salmon, although the methods do not appear to be recorded. In 1949 the Alaska Department of Fisheries was created partly out of a desire to move control of the fishery from Washington, D.C. to the west coast (Pennoyer 1979); in 1951 they established a fish ticket and punch card system at the Montlake Laboratory in Seattle to compile fishery statistics from Alaska (Simpson 1960). In 1957 the Montlake statistical unit moved to Juneau, and in 1958 the first regionally specific average weight estimates for commercial landings were published (USFWS 1958). With Alaskan statehood in 1960, the Alaska Department of Fish and Game (ADF&G) was created and assumed management over the fisheries.

Estimates of average weight and landed biomass from 1960 to the present were reported by ADF&G (1960-1985), but the methods used to determine catch biomass and average weights between 1958 and 1969 were not documented. According to Phil Chitwood (JV Fisheries Ltd., personal communication) average weights reported by ADF&G until at least 1965 were estimated using confidential information such as numbers of fish per case and product weight to round weight conversion factors from selected processors. The estimated average weights for Southeast Alaska were then used to convert the catch estimates from numbers to pounds.

In 1970 Alaska Administrative Code (5AAC 39.130) required buyers and processors of fish to report weights and numbers of salmon purchased; thus landed biomass and average weights were available from fish tickets since 1970.

METHODS

Our basic assumption is that all fish caught commercially in Southeast Alaska became a Southeast Alaska product. Since salmon were frequently transported between areas of Southeast Alaska for processing (Thorsteinson 1950), an assumption of a similiar correspondence between the catches and products for smaller areas (districts) within Southeast Alaska might not be valid. We then assumed that weights of marketed products can be adjusted upward by estimates of conversion factors:

$$c_i = 1 - \text{processing loss},$$

where c_i is the efficiency of converting whole fish to product i. We assumed these conversion factors did not change over time.

Disregarding notation for species and year, round weight for each product category was estimated by conversion from product weight:

$$\hat{y}_i = p_i / \hat{c}_i, \qquad 1 \leq i \leq 11, \qquad (1)$$

where

y_i = round weight of fish in product category i,

p_i = product weight after processing in category i.

The eleven product categories are listed in Table 1. The sum of the round weights across product categories then estimated the total catch biomass (Y):

$$\hat{Y} = \sum^i \hat{y}_i. \qquad (2)$$

The average weight of a fish landed (W) was estimated by:

$$\hat{W} = \hat{Y} / C, \qquad (3)$$

where C is catch in numbers.

Tabulation of catch in numbers and product weights was begun in 1915 for pink salmon, in 1911 for sockeye salmon (*O. nerka*), in 1912 for chum salmon (*O. keta*), and in 1918 for coho salmon (*O. kisutch*). While 1911 was the earliest year in the data series which provided consistent product information, the starting year for the series used in this investigation was slightly later for all but sockeye salmon; later starting years were selected based on considerations irrelevevant to this investigation as explained by Marshall and Quinn 1987).

All products reported in *Alaska Fisheries and Fur-seal Industries* (USBF 1911-1939; USFWS 1940-1959) and by ADF&G (1960-1985) were tabulated, except byproducts. The products tabulated were fresh, frozen, canned, steaks+fillets, fillets, dry-salted, pickled, mild-cured, smoked, pickled bellies, and pickled backs. We considered salmon roe, viscera, fertilizer, meal, bait, feed, and oil to be byproducts and ignored these amounts. In compiling the pack of canned product, no distinction was made between

traditional, smoked, or barbecue salmon. Frozen products were assumed sold headed and gutted (tails and fins intact). Fresh product was assumed to be sold gutted only. We assumed multiple products were not produced from the same fish.

Estimation of Round-to-Product Conversion Factors

Round weight to product weight conversion factors (c_i) were obtained by two methods. We first compiled conversion factors for all products from the literature. Conversion factors for products canned and frozen were then estimated from Alaska Department of Fish and Game product and landed biomass data for the years 1958 through 1985 using linear regressions.

Compilations from the Literature

A summary of conversion factors compiled from the literature is given in Table 1. A graphical summary of the factors shown in Figure 1 illustrates which parts of a fish are involved in the conversions.

The conversion factors for canned products (Table 1) were taken from Jarvis (1944) and are very close to general "rules-of-thumb" factors (Magnusson and Hagevig 1950; Anonymous *Undated*): i.e., roughly 65 to 67% of the round weight of a salmon is converted into canned weight.

The round-to-fresh and round-to-frozen product conversion factors were calculated from a multiplication of average processing losses (Anonymous *Undated*) and average relative proportions (by weight) of individual waste parts (e.g., heads and collars, digestive tracts, fins, eggs, tails) separated from salmon cannery trimmings (Magnusson and Hagevig 1950). The average processing loss for each species was obtained by linearly interpolating the range of 32 and 23% loss for salmon weighing 4 and 16 pounds, respectively, (Anonymous *Undated*) giving yields of 0.68, 0.695, 0.71, and 0.7175 for pink, sockeye, chum, and coho salmon weighing 4, 6, 8, and 9 lb, respectively. The round-to-fresh conversion factor (for a gutted fish) was then estimated by multiplying the average processing loss for each species by the proportion for gut in cannery trimmings (Magnusson and Hagevig 1950). The conversion factor for frozen salmon was calculated in a similar manner using the yields and the proportions for gut and head in cannery trimmings.

Preparation of mild-cured, smoked, pickled and dry-salted products was assumed to begin with a fillet. Yields for a fillet were estimated by multiplying the conversion factors for fish with head and gut removed (the frozen yields, above) by 0.68 for coho and chum, 0.63 for sockeye, or 0.58 for pink, which are approximate yields from cleaned and heads-off fish to fillets

used in preparation of a mild cured product (Sandro Lane, Taku Smokeries, personal communication). Dehydration incurred during the preparation of cured products can vary tremendously as many different curing methods exist (Jarvis 1936, 1950). A short curing could result in as little as 3% moisture loss (Sandro Lane, personal communication). Jarvis quotes a shrinkage of 30% during a curing process of several weeks. We adopted Jarvis' figure for both mild-cured and smoked products. Dehydration during a pickling process was assumed to be 15% based on Jarvis (1936, 1950). We also assumed a 15% dehydration for a dry-salt preparation. The round to product conversion factors we used for cured products were thus the factor for fillets (Table 1) times 0.7 (for mild-cure or smoked products) or 0.85 (for pickled or dry-salted products).

Pickling salmon bellies and backs was common in the earliest years of the industry. Conversion factors for the production of pickled bellies (Table 1) were taken as the ratio of product weight to round weight reported for packs of pickled bellies from 1906 through 1908 (USBF 1904-1910). A factor for pickled backs is estimated as the factor for whole pickled fillets minus the factor for pickled bellies.

Finally, the conversion factor for salmon steaks was assumed to be the same as Jarvis' (1944) factor for canned product; then a conversion factor for the product category steaks plus fillets was calculated as the average of the factor for steaks and the factor for fillets.

Regression Estimates

Examination of Figure 1 allowed us to isolate all calculations involving canned and frozen fish. Because the proportions of these categories varied greatly over time, it was theoretically possible to estimate conversion factors by regressing biomass (adjusted downward by subtracting other products) versus canned and frozen round weights. This requires the assumption that conversion factors do not change over time. Average factors for the conversion of round fish weight to canned and frozen product weights were estimated with a multiple linear regression. The conversion factors are the inverse of the coefficients α for cans (p_3) and β for freezing (F*) in the model:

$$B - \hat{Y}* = \alpha\ p_3 + \beta\ \hat{F}*, \tag{4}$$

where

B = ADF&G biomass estimate,

$\hat{Y}* = \sum_{i=1,4,10,11} p_i/\hat{c}_i,$ where i denotes product categories; and

$$\hat{F}* = p_2 + 1/s(p_5 + p_6/0.85 + p_7/0.85 + p_8/0.7 + p_9/0.7),$$

where s is the frozen-to-fillet conversion factor (Figure 1).

$\hat{Y}*$ in equation 4 is an estimate of the round weight of fish not related to frozen or canned products. This includes fresh product and the minor products whose conversion factors were only indirectly derived from the canned and/or frozen yields (steaks plus fillets, pickled bellies, pickled backs). Then $B - \hat{Y}*$ estimates the catch component related to canned and frozen product yields (including fillets, dry-salted, mild-cured, and smoked). $\hat{F}*$ is the estimated round weight of products related to frozen fish, in their "frozen-yield" state. The values 0.85 and 0.7 in the calculation of $\hat{F}*$ are the dehydration adjustments we used to calculate conversion factors for pickled/salted, and cured/smoked products, respectively.

Because the conversion factors are inverses of the coefficients α and β (equation 4), standard errors for the conversion factors cannot be obtained by taking the inverse of the standard errors for α and β. We computed standard errors for the conversion factors with a formula derived using the Delta Method:

$$se\ (\hat{c}_2) = \hat{c}_2{}^2 * se(\hat{\beta}) \qquad \text{(frozen), and}$$

$$se\ (\hat{c}_3) = \hat{c}_3{}^2 * se(\hat{\alpha}) \qquad \text{(canned).}$$

Comparisons between literature and regression estimates of the conversion factors were made with t-statistic computed as $t = (\hat{c}_i - c_{lit})/se(\hat{c}_i)$.

Interpretation of the Products Marketed Record

Because of an occasional narrative style or lack of detail in some *Alaska Fisheries and Fur-seal Industries* (USBF 1911-1939; USFWS 1940-1959) or *Catch and Production Leaflets* (ADF&G 1960-1985), some of our product weights are interpretations and/or linear interpolations. Estimating the amounts of fresh product marketed from the early data was especially problematic. For example, the weight of fresh product marketed between 1912 and 1917 was an all-species weight: we estimated the weight for each species using the relative proportions of fresh products reported by species in neighboring years (1909 through 1911, and 1918 through 1920). In another case two products from a single species were lumped into one category and exploratory analysis suggested no good criteria for estimating the product weights separately. For example, between 1967 and 1969 and between 1975 and 1979, fresh and frozen products were reported together. We resorted in this

case to coverting to round weight using the conversion factor for frozen product.

In formulating our methods we noted that landed weights are reported in ADF&G (1960-1985) after 1969 instead of round weights. This circumstance has practical significance for coho because a large fraction of coho were caught by troll gear; we assumed these were landed dressed. In compiling the biomass data for the years 1970 through 1985 we therefore multiplied the weight of the troll caught component of the coho catch by 1.088 (the reciprocal of 0.919, Table 1) to maintain continuity in the biomass and average weight time series.

RESULTS

Products

An annotated listing of the product record was produced to document our interpretations of the historical record (Appendix A). The weights of the different products marketed vary widely from year to year besides showing systematic trends over time.

Canning was the dominant product category for all species except coho salmon until the 1960's (Figures 2-3). The most important product from coho salmon in Southeast Alaska has been frozen product. Frozen product also accounts for the second largest proportion (by weight) for both pink and chum salmon, and the proportions of frozen product for both sockeye and chum salmon have increased rapidly since 1960.

Fresh and cured products have also been important coho and sockeye products. Fresh coho salmon accounted for as much as 25% of the total coho product between 1918 and 1945. Fresh coho salmon products were not generally reported in large quantities again (or were grouped with frozen product) until 1981. Fresh sockeye products exhibited this same general trend but accounted for less of the total product weight (up to 6%). The sum of all cured coho products have also accounted for notable (up to 15%) proportions of the total coho product on occasion. Relatively high outputs of cured coho products were reported in 1927, 1945 and 1981. The remaining product categories were typically small contributors to the total product weight.

Conversion Factors for Canned and Frozen Products

Estimates of the round-to-product conversion factors for canned and frozen products, α and β in equation (4), respectively, were

strongly influenced by outliers in the data. In order to produce estimates which fit the central tendencies of the data better, data points with studentized residuals exceeding 3.0 were rejected. Additional procedures for sockeye and coho were invoked as described below.

The regression estimate of the round-to-canned conversion factor for pink salmon (0.637, Table 2) was not statistically different from the literature value of 0.650 (p = 0.37). The regression estimate for the round-to-frozen conversion factor (0.454) was statistically different from the literature value of 0.732 (p < 0.0001). This estimate, however, was very close to the literature value of 0.425 for fillets, suggesting that pink salmon were probably not frozen cleaned and headless as assumed.

The regression estimate of the conversion factor for canned chum salmon (0.611, Table 2) was statistically different from the literature value of 0.670 (p < 0.0001). The regression estimate of the frozen conversion factor (0.680) was also statistically below the literature value of 0.740 (p = 0.0005), suggesting that both literature values for chum are about 6% low. Six outliers (1975, 1965, 1973, 1984, 1966, and 1985) were sequentially rejected during the regression process.

For sockeye salmon the 1975 datum was omitted from the regression because its average weight was a gross outlier. The 1968 and 1978 data were then rejected (in that order) as outliers. The regression estimate of the conversion factor for canned sockeye salmon (0.722) may be different from the literature value of 0.670 (p = 0.066). The regression estimate of the factor for frozen sockeye (0.733) was not statistically different from the literature value of 0.739 (p = 0.78).

Regressions of the coho data were troublesome because unrealistic values (exceeding 0.85) were derived for the canned factors when all data were included and because studentized residuals exceeding 3.0 were not present. To see if rejecting suspect data would yield more reasonable conversion factors, the data for 1958 through 1961, and for 1967 and 1978 were rejected because the average weights estimated for these years exceeded ADF&G estimates by more than 1-lb. The 1985 data was finally rejected for having undue influence on the regression estimates (leverage = 0.29). The final estimate of the conversion factor for canned coho salmon (0.705, Table 2) was not statistically different from the literature value of 0.670 (p = 0.61). The regression estimate of the frozen conversion factor (0.775) was also not statistically different from the literature value (p = 0.23).

The round-to-canned conversion factors determined from the regressions are in general agreement with yields for male and female salmon (Mathisen and Cheyne, *Undated*) measured at Bristol Bay, Kodiak, and Washington State canneries in 1963. Mathisen

and Cheyne found yields in the range of 56 to 65% for pink salmon, 62 to 63% for chum salmon, and 65 to 79% for sockeye salmon. Thus the regression estimates for chum salmon are close to, and those for pink and sockeye are nearly centered within the range of yields from limited but direct measurements in 1963.

We consider these regression estimators as the best empirical estimates of the conversion factors and used them in later calculations.

Biomass Landed

The sum of the adjusted product weights by year and by species (equations 1 and 2) is our recommended estimator of commercial catch biomass in Southeast Alaska before 1958 (Table 3). Plots of catch biomass by species (Figures 4-5) show trends which are similar to plots of catches in numbers; catch biomasses were lower in the period between the late 1940's and the early 1970's and higher in other years.

Average Weights

Results of the average weight calculations are summarized in Tables 4-5 for each species. Graphical comparisons are made for estimates reported in the literature and our estimates in Figures 6-10. In general average fish weights calculated with the product method (equation 3) vary substantially from the constant average weights employed prior to 1958 but are in general agreement with estimates made for landings in Southeast Alaska since 1958 (Figures 6-10 and Tables 4-5).

Average weights for pink salmon compiled since 1958 and average weights estimated by the product method are in good agreement except in 1960 and in some years between 1973 and 1982 (Table 5 and Figures 6-7). The reason for the difference in these estimates is not known. We found however that when data for years after 1976 was sequentially deleted during exploratory regressions (equation 4), the conversion factor for frozen product drifted downward from 0.45 to 0.27 while the factor for canned salmon remained stable, indicating that frozen pink salmon products may have changed substantially over the years. It is interesting to note that the 1931, 1935, 1939, and 1958 federal average weight estimates (which differ sharply from the 4-lb estimate normally used between 1927 and 1957) are in general agreement with the product method average weights for Southeast Alaska (Figures 6-7).

A third method for estimating average weights for pink salmon harvested between 1924-41 was to use "average of number of fish per case as received from individual packers" (Vaughan 1942).

Vaughan used these numbers to convert case packs to catches in numbers. To convert Vaughan's figures into average fish weights we calculated $W = (48 \text{ lbs/case}) / ((\# \text{ fish/case}) * 0.637)$, where the efficiency of conversion (0.637) is taken from Table 2. This resulted in close agreement with the average weights estimated from the product method (Figures 6-7).

Average weights compiled for chum salmon since 1958 and average weights estimated by the product method are in general agreement, except for the large differences in 1975 and 1965. Also 1924 is a probable outlier (Figure 8). The 1975 value was related to an above-average output reported for canned chum salmon, while catches were reported near average. This suggests significant processing of chum caught outside Southeast Alaska may have occurred in 1975. We see no obvious explanation for the unusual values for 1965 and 1924. The downward trending series of average weights prior to 1951 and the transition to higher values after 1951 is the interesting feature of the series.

The average weights estimated for sockeye salmon with the product method run about 1.5 lb below the constant 7-lb federal figure used between 1927 and 1941 (Figure 9). The 7-lb figure seems high in comparison to the product method estimates over this period and a similar (7-lb) figure was not found in the literature. The two methods are in better agreement between 1942 and 1958 because the federal average was changed to 6 lb. The average weights estimated with the product method also are very different from Alaska Department of Fish and Game estimates for 1964, 1968, 1973, 1975, 1976 and 1978. We found no reasonable explanations for the differences between the discrepant average weight estimates since 1964 and suggest that significant local processing of sockeye salmon caught outside Southeast Alaska may have occurred in these years.

The average weights estimated for coho salmon using the product method generally follow the trends reported in ADF&G (1960-1985). Most noticeable discrepancies occur between 1958 and 1961 where deviations to 2.5 lb exist between the two methods (Figure 10). These deviations may be related to problems recording the quantities of fresh and frozen coho salmon marketed from commercial catches. Weights for frozen products from 1960-1961 are interpolations, for example (Appendix A.4). Suggestions for the poor correspondence between the two estimators of average weights in other years are not evident from the product data however. Variation in the coho data may also arise because not all fresh products were sold gutted and not all frozen products were sold headed and gutted.

DISCUSSION

Average fish weight and catch biomass from the commercial harvests between 1911 and 1957 probably cannot be estimated more accurately than by a method which sums product weights adjusted for average processing losses. The data for Southeast Alaska appear generally suitable for the analysis despite limitations in our ability to estimate product conversion factors and to identify years when the closed-system assumption is in error. We notice only one probable outlier in the average weights estimated before 1958 (the 1924 chum salmon value). The method provides estimates which are consistent with other data but is not recommended as a substitute for results derived from sampling studies since 1958. The product method appears best suited to pink salmon, which were largely canned and least suited to coho salmon which were marketed fresh and frozen in large quantities.

The analysis could not resolve several questions about average weights or biomass landed in historical harvests. In particular, a method of determining confidence intervals on the estimated average weights could not be found. Additional data (such as the U.S. Fish and Wildlife annual reports mentioned previously) may help interpret the historical record and should be pursued.

The removal or importation of catches from Southeast Alaska to and from other regions, states, or nations for processing can be deduced, but we found evidence for this mostly in the data since 1960. It may be that interstate shipments of unprocessed fish became more feasible in modern times due to refrigeration. Although it is well-known that fish have been transported between districts in Southeast Alaska for processing, almost no discussion of inter-region, interstate, or international transportation of unprocessed fish was found in the literature documenting catch and production. Competitive pricing is one example we noted, where a buyer in Prince Rupert B.C. might attract catches from Southeast (Bower and Aller 1917). Other examples relate to the capacity of processors to deal with unusually large (or late) catches in a given area (ADF&G 1966), and to freezer ships transporting fish for processing to another area (Thompson 1954).

It is also possible that round-to-canned conversion rates were lower than average during years when exceptionally high harvests occurred (Ricker 1987). The conversion factors for canned product also changed at times when more efficient methods were discovered (Ole Mathisen, University of Alaska, personal communication). Quantifying the magnitude of these effects from data at hand would be very difficult.

We have not attempted to correlate the numerous variables which may be causally related to the trends appearing in these results,

although area and gear considerations are probably important. Catches of sockeye salmon from southern Southeast Alaska have contributed more to the total sockeye catch than northern catches in recent years, for example; and seines, gill nets and lines have replaced fish traps as the dominant gear type.

Different trends for each species occur over time. Average weights of commercially-caught pink and coho salmon have declined most notably: possibly since the 1920's for pink salmon and since the 1960's for coho salmon. Average weights of commercially-caught chum salmon appear to have increased sharply around 1951. These observations are in partial agreement to the analysis of other authors. Ricker (1981) found that all species of salmon caught commercially in British Columbia declined in size between 1950 and 1975, with the declines for pink and coho salmon being much more pronounced than for chum and sockeye salmon. Healey (1986) added recent observations to Ricker's data and further lengthened the British Columbia average weight series using fish-per-case data. Healey notes a pronounced (1 kg) decline in chum salmon average weights between 1928 and 1947 which is similar to the downward trend observed for Southeast chum salmon between about 1920 and 1947 (Figure 8). Healey's data also agrees with our finding of low mean weights in both pink salmon lines in the middle to late 1940's (Figures 6-7) and relatively stable average weights for sockeye salmon before 1950 (Figure 9).

It is noteworthy that the precise origin of the early salmon catch statistics are not well documented, probably because they were generated from a large variety of different sources. This generalization applies to both the fish-per-case data and to the numbers of salmon harvested. We suppose that like methods used even recently, estimates from small samples and industry processing efficiencies have been used in a variety of ways to compute the statistics. Moser (1899) states that salmon were never weighed, but estimated from the case pack. Since that time and at least to the end of the trap era (1960) most canneries in Southeast Alaska probably paid fisherman by the piece. Cold storage facilities and specialty houses in Southeast Alaska, on the other hand, paid by weight much earlier, perhaps before 1945. While the methods and magnitude of uncertainty in the historical data remain obscure, we feel like other authors, that the uncertainties are not large enough to hide trends which occurred.

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Table 1. Round fish weight to product weight conversion factors compiled from literature by product and species.

Product Category	Conversion factor			
	pink	chum	sock	coho
(1) Fresh	0.913	0.892	0.918	0.919
(2) Frozen	0.732	0.740	0.739	0.750
(3) Canned	0.650	0.670	0.670	0.670
(4) Steaks+Fillets	0.538	0.587	0.568	0.590
(5) Fillets	0.425	0.503	0.466	0.510
(6) Dry-salt	0.361	0.428	0.396	0.434
(7) Pickled	0.361	0.428	0.396	0.434
(8) Mild-cure	0.297	0.352	0.326	0.357
(9) Smoked	0.297	0.352	0.326	0.357
(10) Pickled bellies	0.211	0.211	0.211	0.211
(11) Pickled backs	0.150	0.217	0.185	0.223

Table 2. Round fish weight to product weight conversion factors from linear regressions for canned and frozen products by species. Estimates are shown ± 1 standard error.

Product Category	Conversion factor			
	pink	chum	sock	coho
(2) Frozen	0.454 ± 0.039	0.680 ± 0.015	0.733 ± 0.021	0.775 ± 0.020
(3) Canned	0.637 ± 0.014	0.611 ± 0.007	0.722 ± 0.027	0.705 ± 0.068

Table 3. Estimates of pink, chum, sockeye, and coho salmon biomass landed in the commercial fisheries of Southeast Alaska, 1911-85.[a]

	Catch in lb			
Year	pink	chum	sock	coho
1911			14,617,562	
1912		47,263,574	16,853,210	
1913		20,862,380	11,907,127	
1914		47,181,093	19,703,719	
1915	137,364,310	29,881,014	15,962,784	
1916	100,608,656	40,638,230	12,080,337	
1917	166,395,891	61,587,093	13,963,414	
1918	157,479,788	77,361,821	14,984,770	12,749,032
1919	116,171,033	91,160,711	17,084,958	13,680,092
1920	76,418,391	66,744,155	15,028,100	8,142,843
1921	33,352,933	15,396,388	7,587,730	8,520,741
1922	103,365,013	33,820,488	9,502,219	10,639,566
1923	169,761,106	34,410,704	11,908,351	10,376,641
1924	126,423,110	63,519,649	12,870,744	8,772,678
1925	128,688,375	67,275,288	9,585,914	8,754,258
1926	162,771,616	49,464,990	11,578,756	11,406,588
1927	44,428,747	18,073,881	7,786,796	13,542,561
1928	161,836,320	46,048,498	7,147,944	18,908,445
1929	116,452,988	23,380,792	10,930,192	11,972,249
1930	174,604,760	23,118,365	14,764,171	15,944,028
1931	152,627,203	22,010,691	9,871,129	10,593,817
1932	104,032,959	45,885,462	9,244,717	11,671,132
1933	111,378,706	33,668,025	5,415,641	10,827,423
1934	197,740,699	31,375,741	7,198,047	17,609,762
1935	165,839,641	42,955,792	10,679,180	14,089,212
1936	220,534,369	62,990,247	14,545,889	15,908,230
1937	161,552,824	41,486,578	11,166,602	10,328,209
1938	142,322,678	38,921,540	13,066,192	19,794,677
1939	111,207,565	24,010,405	13,659,953	9,356,769
1940	109,870,342	38,881,711	8,363,870	18,713,557
1941	274,343,472	25,995,703	9,175,747	21,170,752
1942	132,330,890	47,979,120	7,745,884	19,594,948
1943	78,642,216	56,879,851	5,684,084	14,814,323
1944	83,008,120	58,631,059	9,504,202	14,219,024
1945	79,589,906	27,785,382	9,094,837	27,340,949
1946	75,987,225	34,472,356	4,528,116	18,818,726
1947	51,827,811	21,664,670	3,723,758	12,973,162
1948	52,198,459	32,975,711	2,643,076	18,294,083
1949	160,284,337	20,560,454	2,634,186	17,789,853

- Continued -

Table 3. (p. 2 of 2).

Year	Catch in lb			
	pink	chum	sock	coho
1950	40,940,133	41,198,465	3,313,791	14,155,447
1951	93,025,496	38,877,575	4,685,532	25,470,213
1952	44,841,901	42,893,360	4,953,648	12,663,379
1953	26,404,349	33,869,748	8,419,180	10,672,597
1954	39,774,781	47,874,282	7,553,266	17,634,420
1955	41,206,762	14,224,920	3,714,030	9,867,305
1956	47,985,726	24,482,645	5,398,700	8,554,655
1957	30,704,430	30,344,866	5,476,917	10,376,722
1958	52,621,152	30,113,121	5,980,742	8,587,697
1959	35,768,567	12,634,185	4,526,439	8,604,222
1960	10,455,381	10,216,266	3,235,037	5,292,095
1961	63,922,100	23,118,200	4,754,700	7,799,600
1962	45,746,850	19,470,180	4,858,160	9,585,580
1963	70,054,650	12,649,630	3,905,800	11,304,790
1964	71,505,320	19,535,900	5,500,390	12,834,340
1965	42,431,740	15,033,440	6,620,440	13,624,730
1966	89,927,949	28,149,153	7,168,012	10,800,282
1967	14,000,630	17,379,956	6,120,708	7,796,034
1968	82,781,816	28,822,422	5,815,425	12,190,448
1969	20,453,437	5,165,036	4,707,164	4,354,377
1970	41,442,236	20,483,428	4,248,930	5,822,974
1971	34,414,077	16,095,008	3,967,147	7,136,576
1972	38,468,017	26,840,276	5,698,331	10,585,584
1973	23,423,770	17,748,456	7,023,806	6,161,160
1974	19,270,771	17,005,676	4,657,449	9,412,587
1975	15,552,250	6,430,914	1,522,036	3,083,857
1976	23,350,853	11,009,767	3,930,665	6,354,875
1977	67,890,028	7,509,417	7,555,140	8,247,515
1978	67,767,148	8,102,540	5,217,022	11,482,258
1979	43,255,000	8,452,000	6,846,000	8,854,000
1980	56,315,000	16,452,000	7,056,000	8,052,000
1981	80,784,000	8,380,000	6,629,000	10,525,000
1982	79,455,000	13,377,000	10,040,000	15,459,000
1983	117,133,000	10,695,000	9,549,000	13,672,000
1984	88,450,000	38,303,000	7,482,000	16,241,000
1985	165,499,000	29,559,000	11,512,000	20,384,000

[a]The biomass landed between 1911 and 1957 was calculated from products. The biomass landed for 1958-59 is from *Alaska Fisheries* (USFWS 1958-59), and landings after 1959 are from ADF&G (ADF&G, 1960-85).

Table 4. Estimated average weights of pink, chum, sockeye, and coho salmon landed in the commercial fisheries of Southeast Alaska, 1911-57[a].

| | Average weights in lb | | | |
Year	pink	chum	sock	coho
1911			5.18	
1912		9.28	5.69	
1913		8.25	5.30	
1914		8.74	5.69	
1915	4.59	8.24	5.63	
1916	4.59	8.30	5.03	
1917	3.97	8.79	5.04	
1918	4.18	8.42	5.44	7.86
1919	4.76	9.64	5.31	7.50
1920	3.65	8.33	5.71	7.79
1921	4.77	8.69	5.14	8.47
1922	4.39	9.08	5.05	8.14
1923	4.38	8.66	5.09	7.64
1924	4.34	12.45	5.25	7.73
1925	4.66	7.79	5.28	7.39
1926	5.09	8.24	5.69	9.68
1927	5.54	8.18	5.37	10.06
1928	4.49	9.45	5.29	8.76
1929	5.33	8.90	5.75	8.75
1930	4.02	8.54	5.71	7.98
1931	5.60	7.72	5.41	9.20
1932	4.60	8.20	5.60	8.40
1933	4.32	7.40	5.36	8.85
1934	3.93	8.24	5.80	9.00
1935	5.48	8.45	5.64	8.01
1936	4.35	8.28	6.05	8.84
1937	4.59	7.47	5.11	7.38
1938	4.70	8.54	5.15	9.00
1939	4.69	7.09	5.49	8.34
1940	3.78	8.41	5.55	10.18
1941	4.57	8.78	5.48	8.42
1942	3.99	8.82	4.94	8.86
1943	4.36	8.32	5.06	8.82
1944	4.29	8.52	5.52	10.89
1945	3.68	8.37	5.40	10.57
1946	3.06	8.60	5.10	7.95
1947	3.69	6.45	4.99	8.39

- Continued -

Table 4. (p. 2 of 2).

	Average weights in lb			
Year	pink	chum	sock	coho
1948	3.64	8.23	5.04	8.53
1949	3.65	7.10	5.38	7.80
1950	4.34	8.62	6.00	8.57
1951	4.19	9.43	5.72	7.69
1952	4.57	10.27	5.39	7.25
1953	5.30	9.56	6.12	9.17
1954	4.46	11.28	6.25	9.96
1955	4.41	9.31	5.45	7.37
1956	3.56	8.95	5.86	9.14
1957	4.48	9.01	5.31	8.53

[a]Average weights estimated with the product method.

Table 5. Average weights of pink, chum, sockeye, and coho salmon landed in the commercial fisheries of Southeast Alaska as estimated by the product method and by sampling, 1958-1985.[a]

	Average weights in lb							
	pink		chum		sock		coho	
Year	Prod.	ADF&G	Prod.	ADF&G	Prod.	ADF&G	Prod.	ADF&G
1958	5.39	5.35	10.49	10.88	5.56	6.16	10.76	8.99
1959	4.64	4.56	10.35	10.13	5.31	5.82	9.13	7.87
1960	3.92	3.50	9.74	10.02	5.37	5.50	9.81	7.34
1961	5.11	5.06	9.05	9.03	6.43	6.39	10.17	8.77
1962	4.26	3.95	10.00	9.75	6.29	6.29	8.37	7.84
1963	3.96	3.66	8.86	8.55	5.82	5.76	9.23	8.87
1964	3.84	3.85	10.12	10.09	6.93	5.95	8.28	8.08
1965	3.61	3.90	7.73	10.20	6.00	6.10	8.07	8.80
1966	4.53	4.40	9.46	8.60	7.19	6.80	8.91	8.80
1967	4.68	4.50	10.32	9.60	6.24	6.30	9.97	9.00
1968	3.39	3.30	10.97	10.90	10.13	7.00	8.32	7.90
1969	3.74	4.20	8.72	9.20	5.62	5.80	7.24	7.30
1970	3.74	3.89	8.13	8.38	5.77	6.36	8.11	7.90
1971	3.79	3.68	8.21	8.27	6.59	6.37	6.85	8.06
1972	2.90	3.10	9.11	9.12	6.52	6.22	7.50	7.30
1973	4.01	3.63	11.02	9.69	7.97	6.94	7.50	7.77
1974	4.45	3.94	10.26	10.11	6.01	6.78	6.59	7.76
1975	4.30	3.86	19.06	9.37	11.91	6.21	7.35	7.48
1976	4.56	4.38	11.16	10.68	8.59	6.60	7.17	8.11
1977	4.22	4.90	8.89	10.17	6.24	6.96	8.39	9.12
1978	2.82	3.19	8.90	9.32	9.02	6.62	7.84	7.05
1979	3.66	3.94	9.14	9.52	6.51	6.38	6.76	7.30
1980	3.59	3.89	9.42	9.96	5.48	6.31	6.76	7.43
1981	4.27	4.26	9.81	9.86	6.07	6.14	8.49	7.87
1982	3.64	3.28	10.22	9.89	6.95	6.72	7.42	7.61
1983	2.99	3.12	9.61	8.94	6.15	6.09	7.79	7.27
1984	3.74	3.59	8.27	9.36	6.26	6.16	8.28	8.89
1985	3.13	3.18	8.27	9.03	5.61	6.18	7.62	8.24

[a]Landed biomass and catch in numbers reported in *Alaska Fisheries* (USFWS 1958-59) and by ADF&G (1960-85) were used to estimate average weights as the ratio of biomass to numbers. ADF&G estimates of biomass landed in the coho troll fishery between 1970 and 1985 were divided by 0.919 to estimate round weight from the reported landed weight.

Waste proportions

pink chum sock coho

.271 .371 .270 .285/a

.837 .896 .856 .884/b

a/Gut; b/Head + Collar + Gut

Fresh cf's

pink chum sock coho

.913 .892 .918 .919

1-.271* (1-.680)

Yield to fully dressed

pink chum sock coho

.680 .710 .695 .718

1-.837 * (1-.680)

Frozen cf's

pink chum sock coho

.732 .740 .739 .750

.732 * .58

Fillet cf's

pink chum sock coho

.425 .503 .466 .510

Yield from fish minus heads + guts to fillets

pink chum sock coho

.58 .68 .63 .68

.7 * .425

.85 * .425

Cured/Smoked cf's

pink chum sock coho

.297 .352 .326 .357

Pickled/salted cf's

pink chum sock coho

.361 .428 .396 .434

Figure 1. Schematic diagram of the calculations used to derive round-to-product weight conversion factors (cf) from literature values. Factors tabled are for each species. The formulas show calculations for pink salmon.

Pink salmon products, Southeast Alaska

Chum salmon products, Southeast Alaska
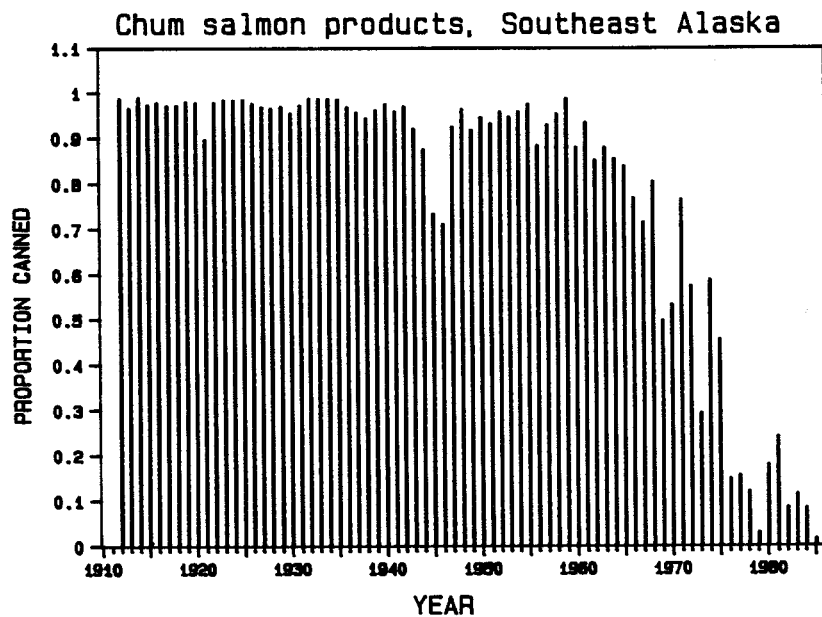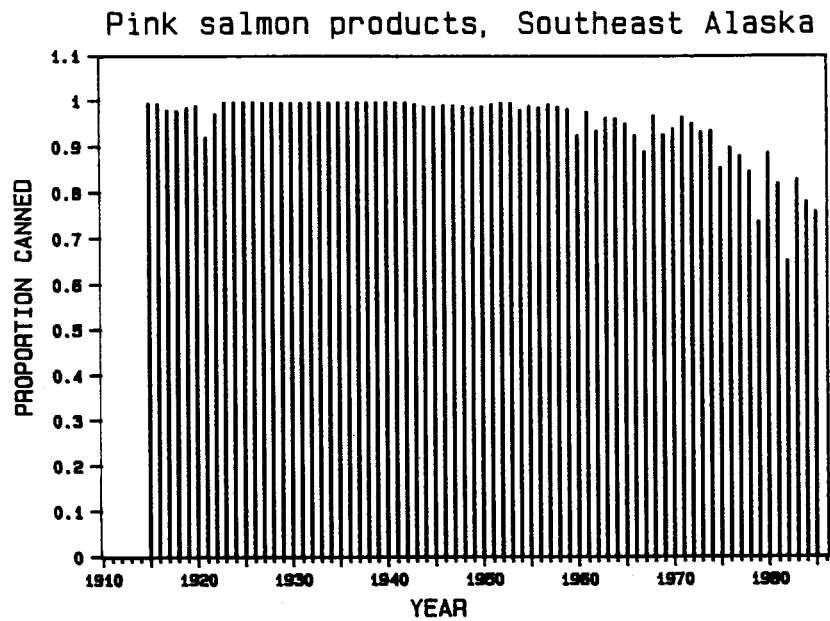
Figure 2. Proportions of pink and chum products marketed in Southeast Alaska which were canned products.

Sockeye salmon products, Southeast Alaska

Coho salmon products, Southeast Alaska
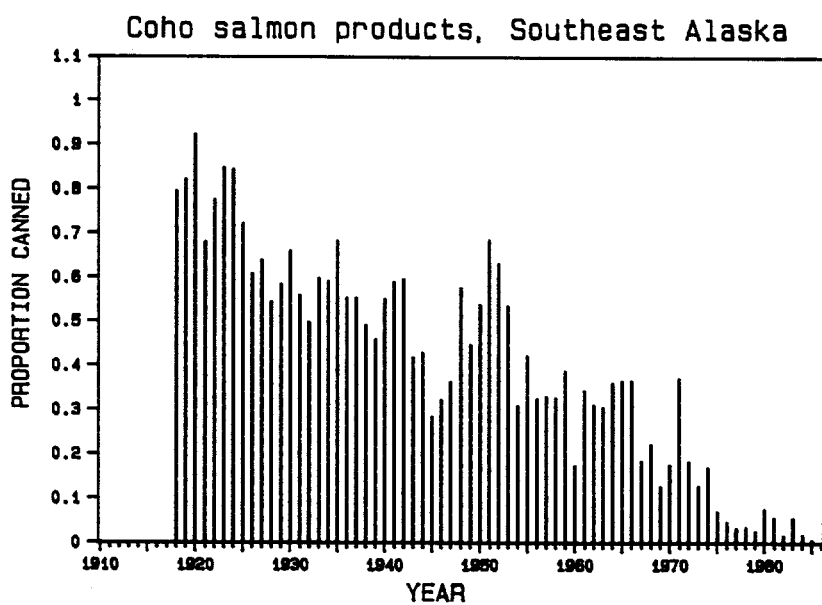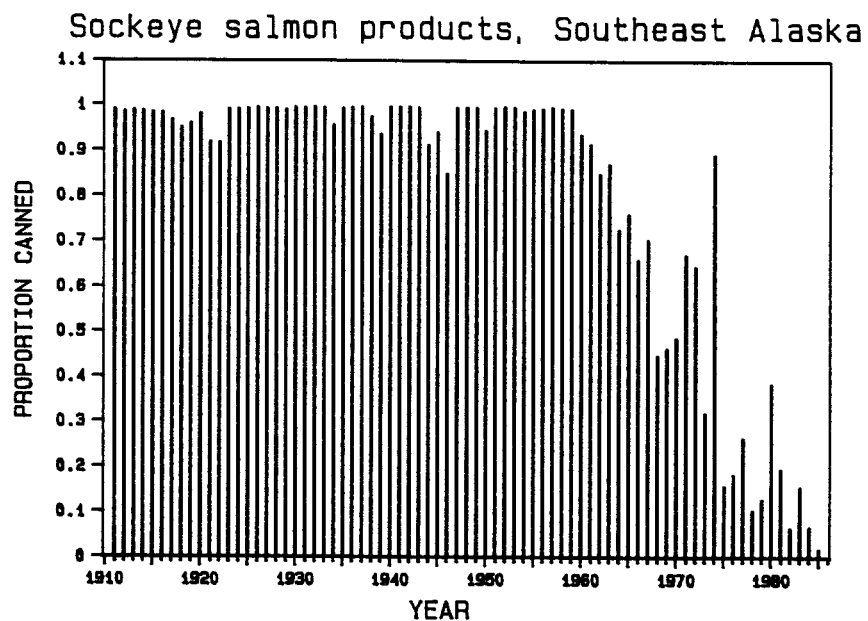
Figure 3. Proportions of sockeye and coho products marketed in Southeast Alaska which were canned products.

Pink Salmon
Estimated Southeast Alaska Commercial Landings

Products 1915-57

Federal 1958-59

ADF&G 1960-85

Chum Salmon
Estimated Southeast Alaska Commercial Landings

Products 1912-57

Federal 1958-59

ADF&G 1960-85
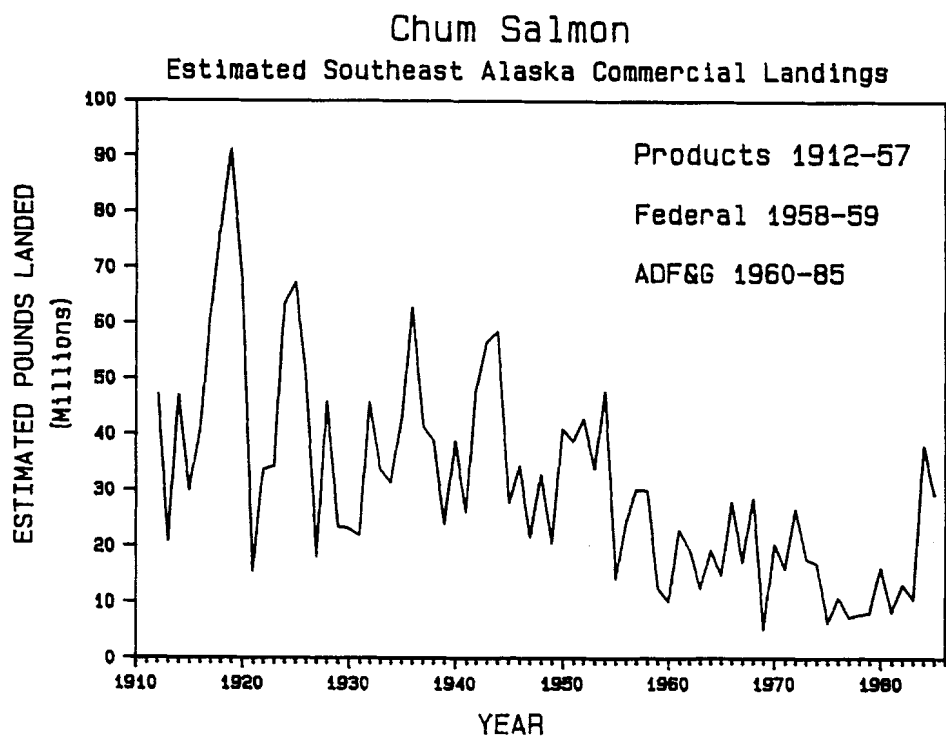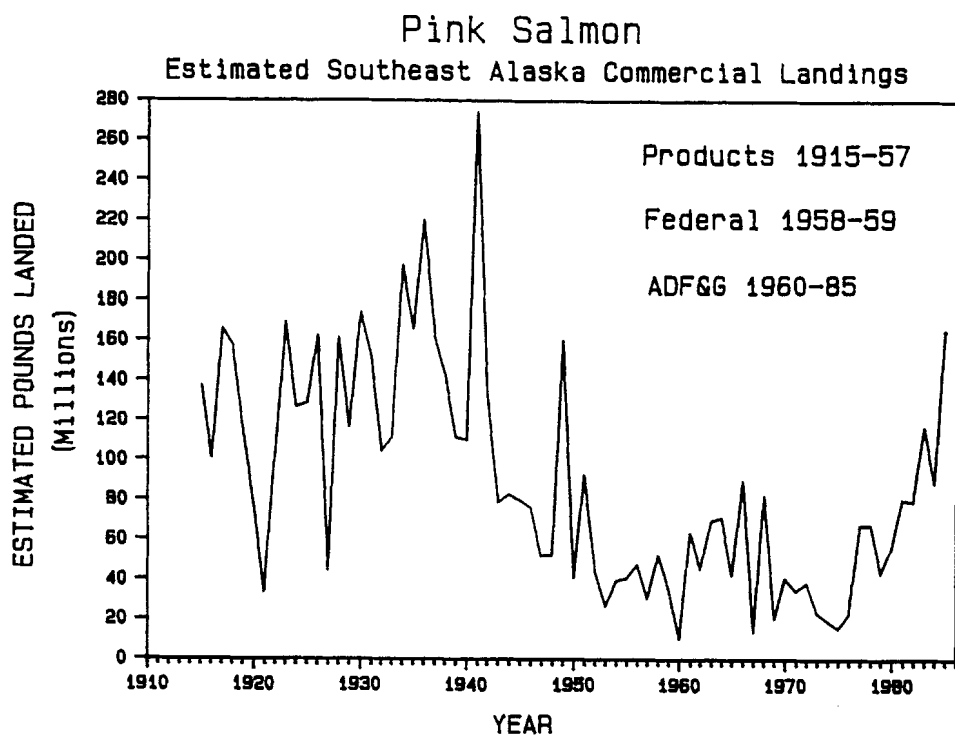
Figure 4. Plots of estimated pink and chum salmon biomass landed commercially in Southeast Alaska.

-26-
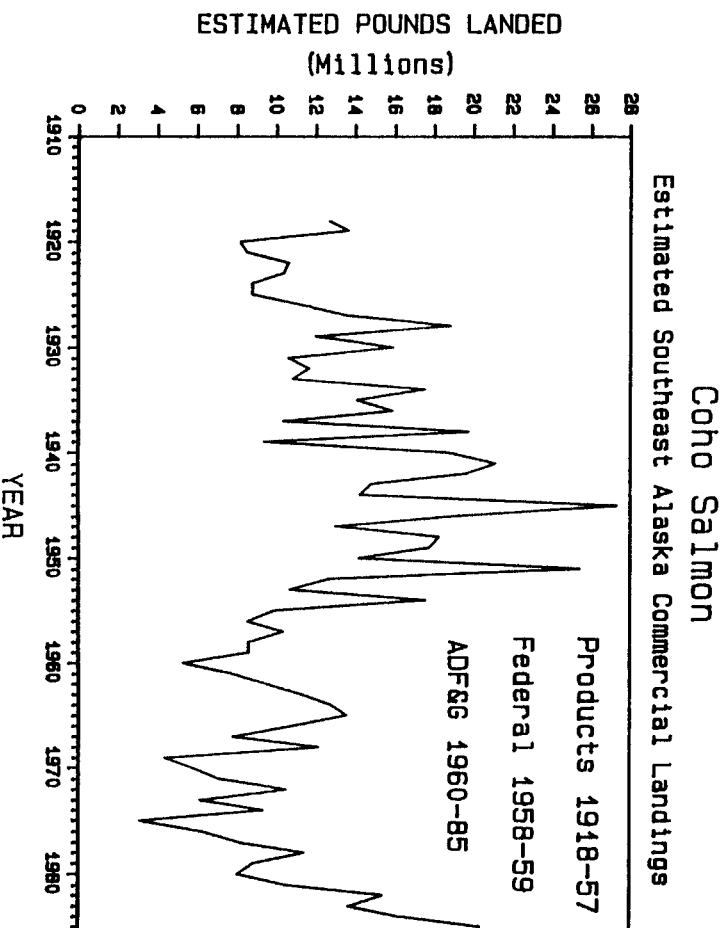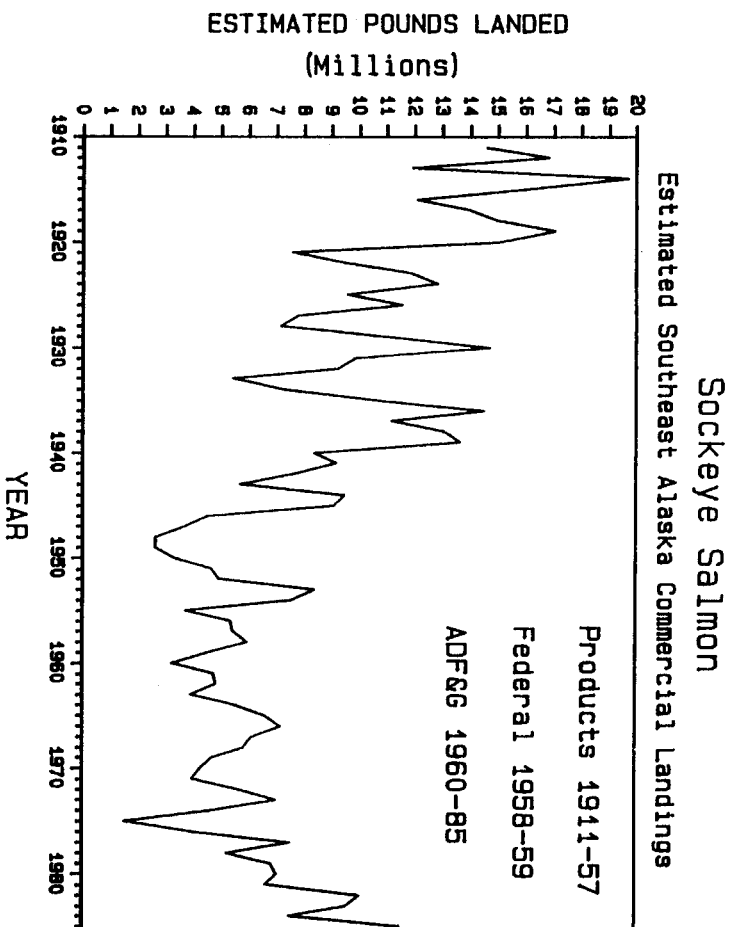
Figure 5. Plots of estimated sockeye and coho salmon biomass landed commercially in Southeast Alaska.

Even-year pink salmon average weight, Southeast Alaska
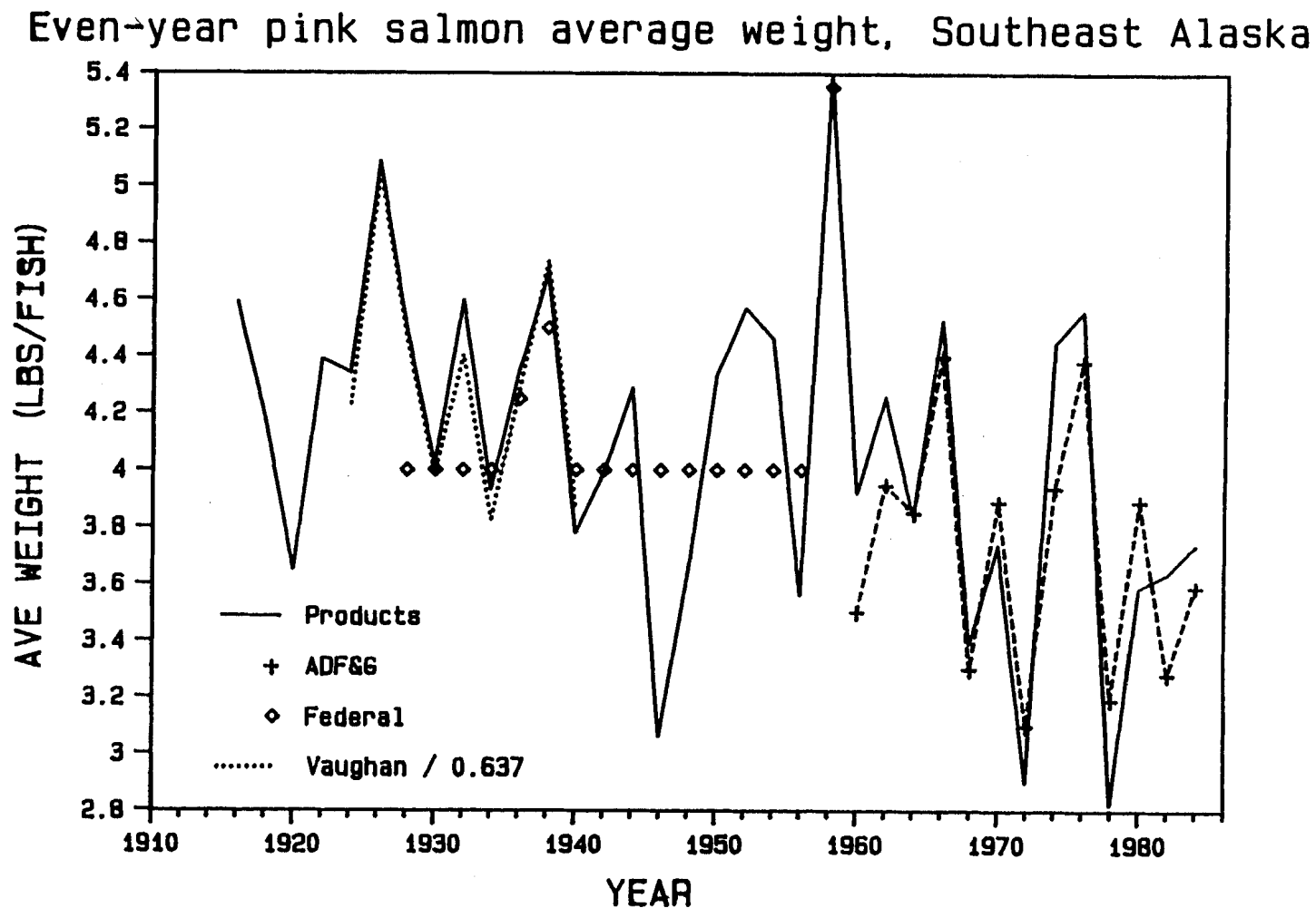
Figure 6. Estimated average weights of even-year pink salmon landed commercially in Southeast Alaska as determined from product weights, and U.S. Fish and Wildlife or Alaska Department of Fish and Game sampling.
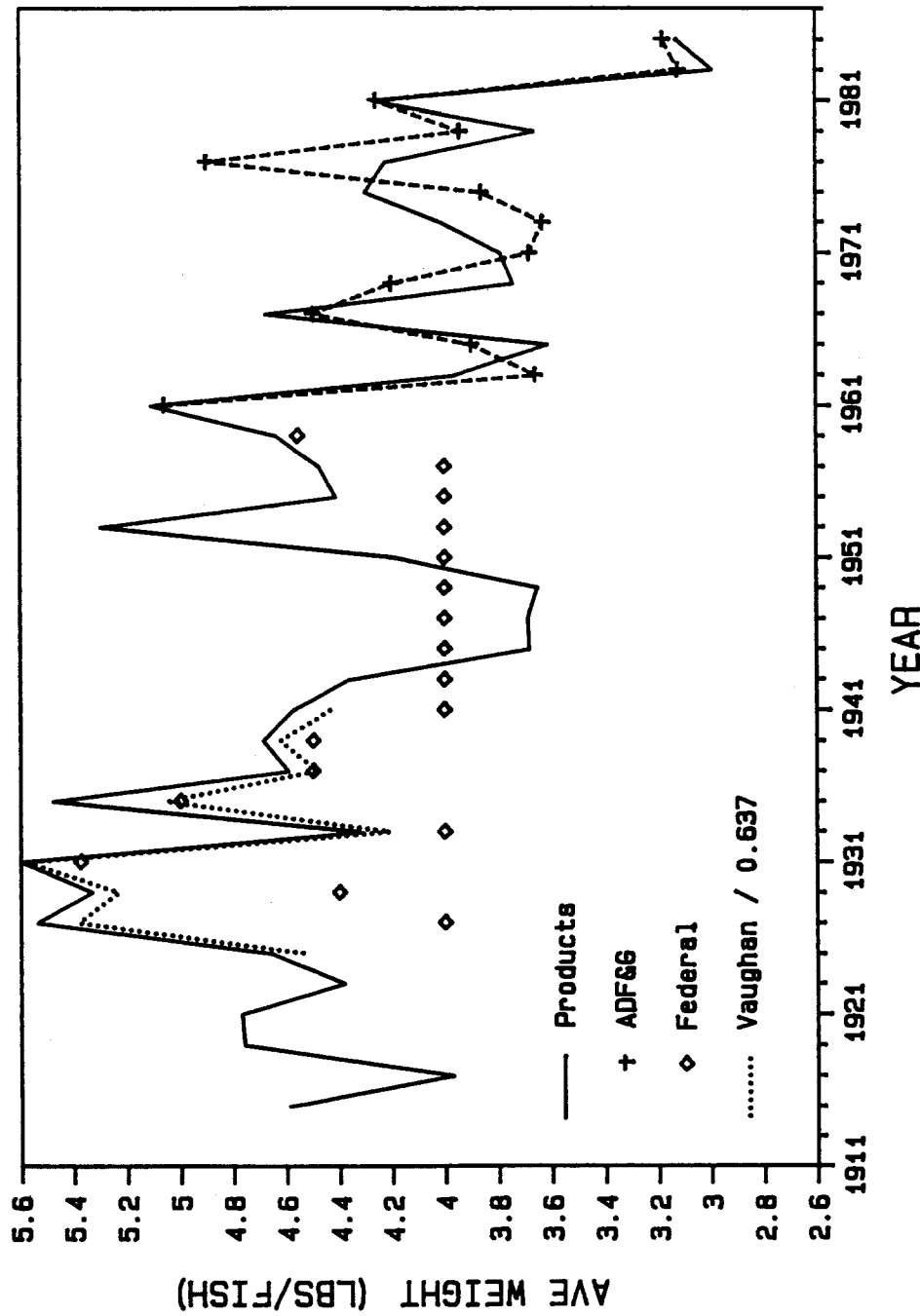
Figure 7. Estimated average weights of odd-year pink salmon landed commercially in Southeast Alaska as determined from product weights, and U.S. Fish and Wildlife or Alaska Department of Fish and Game sampling.
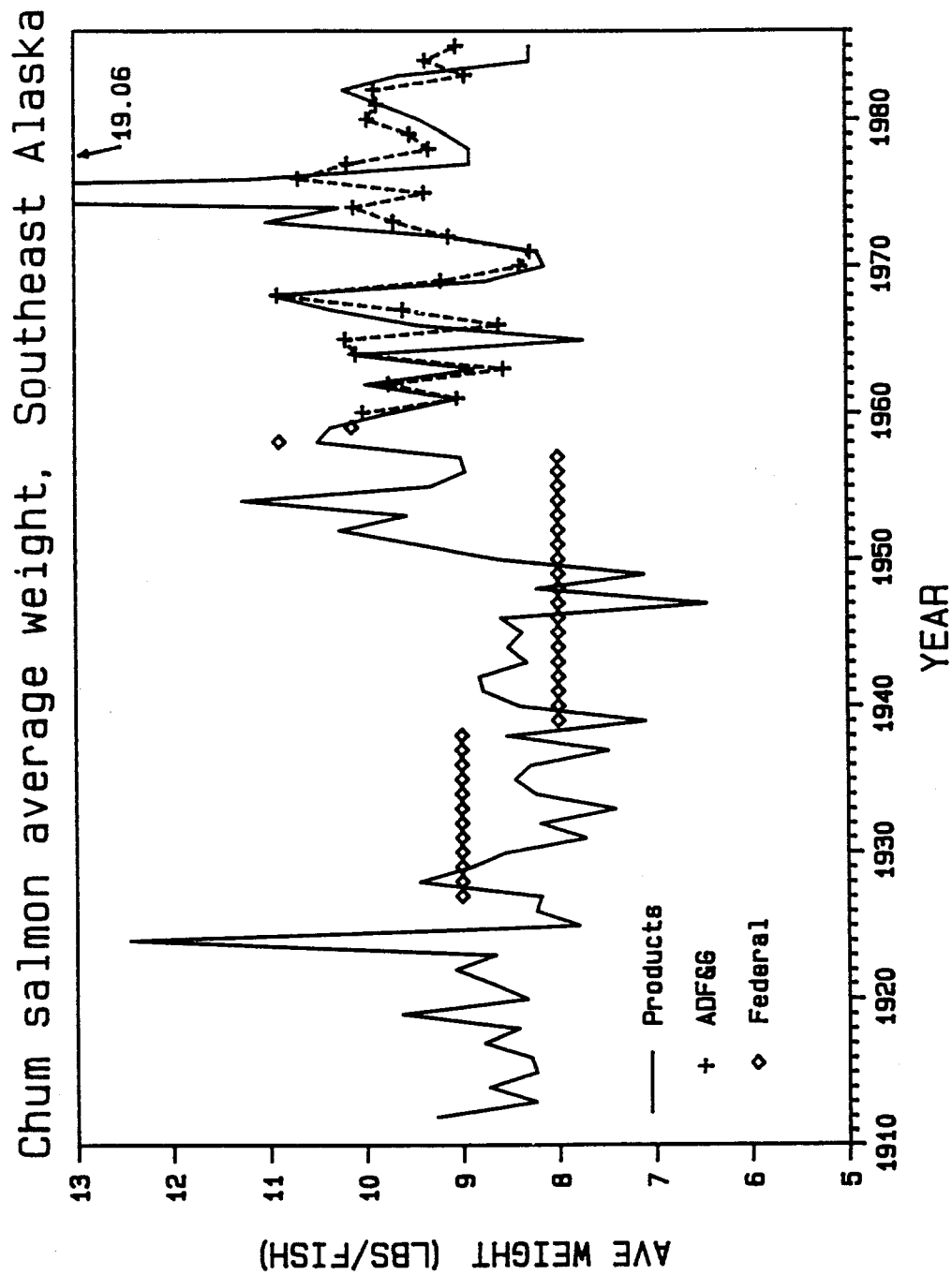
Figure 8. Estimated average weights of chum salmon landed commercially in Southeast Alaska as determined from product weights, and U.S. Fish and Wildlife or Alaska Department of Fish and Game sampling.

Sockeye salmon average weight, Southeast Alaska
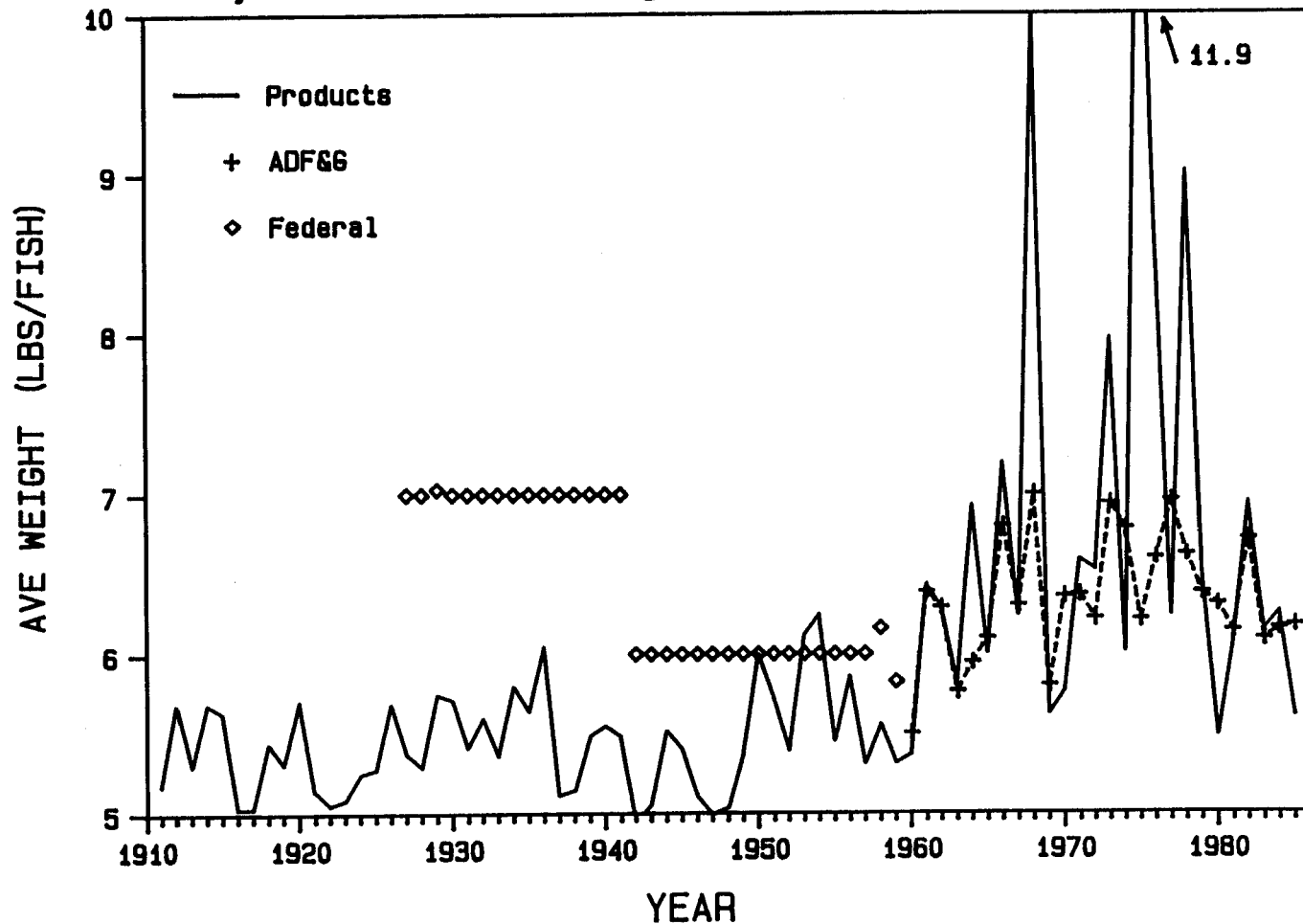
Figure 9. Estimated average weights of sockeye salmon landed commercially in Southeast Alaska as determined from product weights, and U.S. Fish and Wildlife or Alaska Department of Fish and Game sampling.
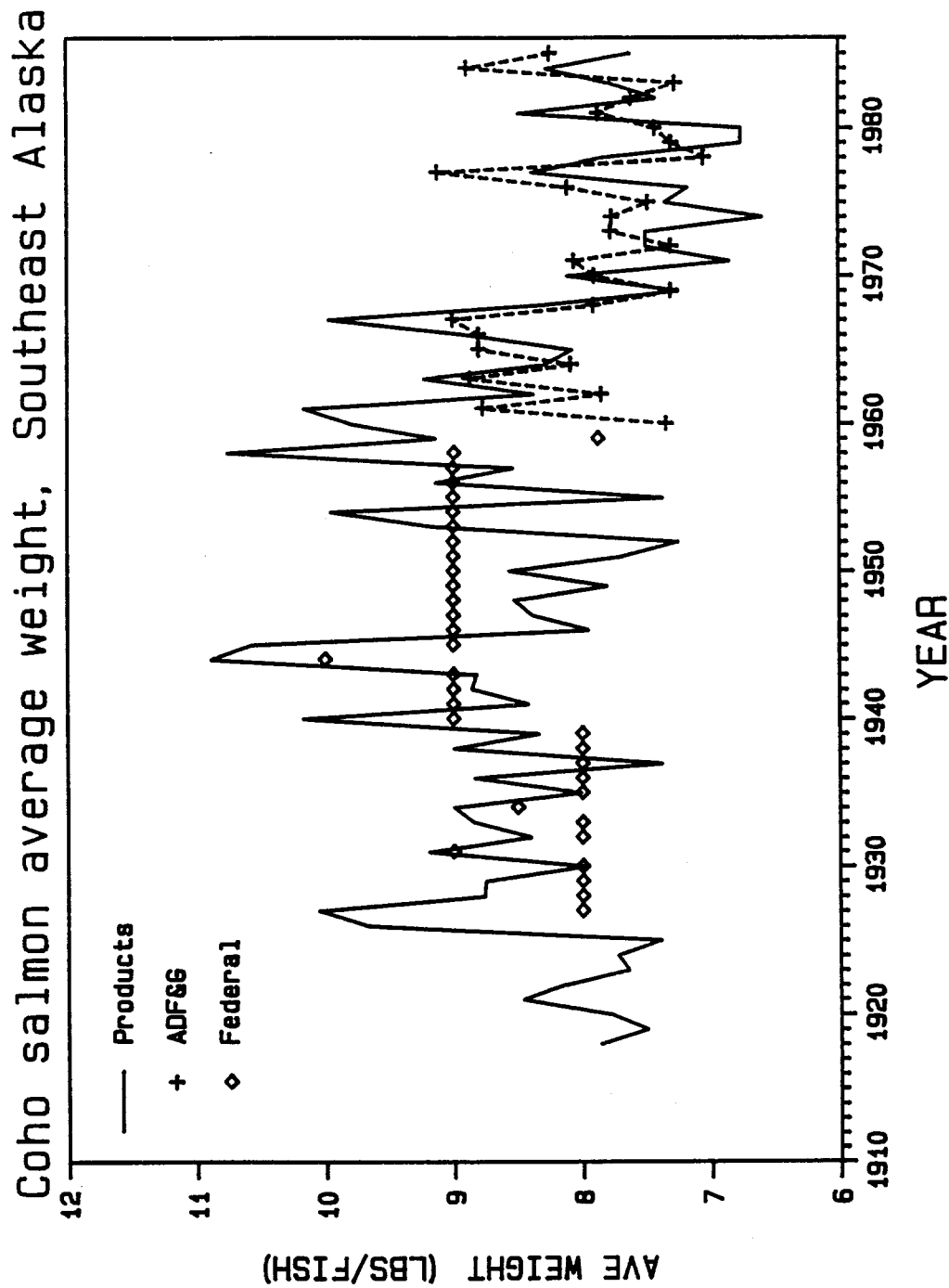
Figure 10. Estimated average weights of coho salmon landed commercially in Southeast Alaska as determined from product weights, and U.S. Fish and Wildlife or Alaska Department of Fish and Game sampling.

APPENDIX A

Appendix A.1. Pink salmon products of the Southeast Alaska
salmon Industry. One case equals 48 1-lb
tins, other product measures are in pounds.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1915	1820191	0	15800	149087	0	0	0	0	F1
1916	1330824	0	57200	123467	15029	0	0	0	F2
1917	2149570	77600	1090600	375676	226253	53100	0	16800	F3,R1,O1
1918	2035383	0	1049800	546069	272850	0	0	0	
1919	1524522	0	5200	450429	356680	0	0	0	
1920	1007637	0	12200	203444	105816	0	0	0	R1
1921	416781	0	75600	1586543	0	0	0	0	F4
1922	1332552	0	0	637338	1023707	0	0	0	F4,R2,O2
1923	2252019	0	5000	45994	0	0	0	0	
1924	1677454	0	6000	4000	250	0	0	0	F4,R3
1925	1707456	0	8200	3064	0	0	0	0	
1926	2158699	0	32800	2513	285	4498	0	0	
1927	588291	0	1800	0	42570	135	0	0	
1928	2142838	0	5000	9187	155571	0	0	0	
1929	1542615	0	12950	8254	72790	2433	0	0	
1930	2309976	0	26100	3749	210760	0	0	0	

F1. Fresh : Linear interpolation between : the average of percent of total fresh for each year 1909-11,
        and the same average for 1918-20, times 2416603 lbs fresh product in 1915.
F2. Fresh : Linear interpolation as in F1, times 1713848 lbs fresh product in 1916.
F3. Fresh : Linear interpolation as in F1, times 4559785 lbs fresh product in 1917.
F4. Fresh : May include a contribution from outside SE Alaska.
R1. Frozen : May include a contribution from a Seward plant.
R2. Frozen : May include a contribution from Western Alaska.
R3. Frozen : May include a contribution from outside SE Alaska.
O1. Other : Pickeled bellies.
O2. Other : Does not include a possible proportion of 40600 lbs dried, 600 lbs kippered, or 75000 lbs dry-
        salted in Alaska.

Appendix A.1.　(p. 2 of 5).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1931	2013442	0	23800	28	182593	0	0	186882	O3
1932	1379006	0	0	0	54670	0	0	82500	O4
1933	1478013	0	0	0	2574	0	0	25400	O5
1934	2622362	0	0	125148	95	0	0	24600	O5
1935	2200060	0	0	0	26350	0	0	0	
1936	2925144	0	0	2500	51128	0	0	140908	O6
1937	2143168	0	0	0	26431	0	0	0	
1938	1886769	0	0	12925	61020	0	0	140448	O7
1939	1475358	0	0	500	15456	0	0	80020	O8
1940	1458071	0	0	0	0	0	0	370683	O9
1941	3640761	0	0	0	188	0	0	541420	F5,R4,O10
1942	1756047	0	0	5623	426	0	0	19560	F6,R5,O11
1943	1038439	0	0	11245	172601	0	0	140786	R5,O5
1944	1086095	0	0	10138	524943	0	0	7105	O6
1945	1041649	0	18410	26996	462052	0	0	22577	O4
1946	999914	0	0	24402	278647	0	0	0	

F5.　Fresh　: Assumed equal to 1940.
F6.　Fresh　: Linear interpolation.
R4.　Frozen : Average (1940+1942) % frozen times 5977656 lbs frozen in S.E.
R5.　Frozen : May include a small contribution from central Alaska.
O3.　Other　: Frozen fillets.
O4.　Other　: Fresh & frozen bait.
O5.　Other　: Fresh bait.
O6.　Other　: Frozen bait.
O7.　Other　: 79,028 lbs bait; 61,420 lbs animal food.
O8.　Other　: Frozen bait & mink feed.
O9.　Other　: 3795 lbs fresh & frozen bait; 366,888 lbs fresh & frozen feed.
O10. Other　: 38055 lbs fresh bait, 503365 lbs fresh & frozen feed.
O11. Other　: Frozen feed.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1947	680817	0	0	17190	230283	0	0	0	
1948	684442	0	0	158	283014	0	0	864	O12
1949	2103982	0	0	976130	305713	0	0	16395	O4
1950	535662	0	2000	4476	256889	0	0	0	
1951	1226582	0	0	0	271762	0	0	31248	O6
1952	593422	0	0	8915	52609	0	0	248	O6
1953	349534	0	0	1486	29151	0	0	936	O6
1954	515166	0	0	7171	430170	0	0	17224	O6
1955	540495	0	0	0	217341	0	0	1305	O6
1956	626450	0	0	0	354439	0	0	49549	O6
1957	404581	0	0	0	98949	0	0	6766	O6
1958	693247	0	0	0	348458	0	0	0	
1959	472684	0	0	0	352656	0	0	0	
1960	139998	0	0	0	525446	0	4	0	R6,S1,O13
1961	831578	0	0	0	851954	0	26	0	R7,S2,O14
1962	600576	0	0	169000	1755340	0	160	0	
1963	959148	0	0	0	1623260	0	0	0	
1964	900425	0	0	0	1601670	0	0	0	O15

R6. Frozen : Linear interpolation between : the average of percent of total frozen for each year 1957-59,
          and the same avearge for 1962-64, times 7645685 lbs frozen product in 1960.
R7. Frozen : Linear interpolation as in F1, times 8109000 lbs frozen product in 1961.
S1. Smoked : Linear interpolation of the smoked products as in F1, times 1449 lbs smoked in SE.
S2. Smoked : Linear interpolation of the smoked products as in F1, times 4300 lbs smoked in SE.
O12. Other : 504 lbs frozen bait, 360 lbs frozen feed.
O13. Other : 320978 lbs frozen bait not allocated to species.
O14. Other : 250100 lbs frozen bait not allocated to species.
O15. Other : 31260 lbs frozen bait not allocated to species.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1965	487010	0	0	0	1156369	0	0	0	O16
1966	1108688	0	0	144450	3997927	0	25	0	O17
1967	164962	0	0	0	962628	0	0	0	FR1,O18
1968	1084153	0	0	0	1575551	0	0	0	FR1,O19
1969	218290	0	0	0	795542	0	0	0	FR1,O20
1970	487208	0	0	3716	1423792	0	0	0	O21
1971	448452	0	0	0	716843	0	0	0	
1972	447085	0	0	113	1038484	0	0	0	
1973	313424	0	0	15873	1030243	0	0	0	
1974	265497	0	76300	107704	652650	0	0	0	O22
1975	186124	0	0	0	1495737	0	0	0	FR1
1976	279439	0	0	0	1469480	0	0	0	FR1,O23
1977	652577	0	0	0	4171736	0	0	0	FR1
1978	634683	0	0	0	5445043	0	0	0	FR1
1979	356502	0	0	0	6057900	0	0	0	FR1
1980	588106	0	0	0	3486800	0	0	0	
1981	821250	354000	0	165000	8016000	0	0	0	C1

Canned production for 1979-1985 calculated from pounds rounded to the nearest 1000 lbs.
C1. M-Cure : An unknown proportion may be pickled .
FR1. Fsh/Fzn: Fresh and frozen production combined; entire allocated to frozen.
O16. Other : 640533 lbs frozen bait & 6046 lbs unknown frozen not allocated to species.
O17. Other : 1249352 lbs frozen bait not allocated to species.
O18. Other : 857990 lbs fresh/frozen bait not allocated to species.
O19. Other : 1368016 lbs fresh/frozen bait not allocated to species.
O20. Other : 36527 lbs general and 78192 lbs bait, both fresh/frozen, not allocated to species or products.
O21. Other : 29132 lbs frozen bait not allocated to species.
O22. Other : 13392 lbs unspecified not allocated to species or products.
O23. Other : 48496 lbs whole/dressed fresh/frozen general not allocated to species or products.

Appendix A.1.   (p. 5 of 5).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1982	690750	12000	0	2501000	15128000	0	0	0	C1
1983	1160896	0	0	393000	10982000	0	0	0	
1984	901854	0	0	2077000	10027000	0	0	0	
1985	1516396	409000	0	2517000	20093000	0	0	0	C1

Canned production for 1979-1985 calculated from pounds rounded to the nearest 1000 lbs.

Appendix A.2. Chum salmon products of the Southeast Alaska salmon Industry. One case equals 48 1-lb tins, other product measures are in pounds.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1912	596912	0	5000	17155	230798	0	0	0	F1
1913	257644	0	19000	20688	330537	5282	0	11800	F2,D1,O1
1914	597411	0	7800	72721	89644	0	0	3600	F3,O2
1915	373329	0	1600	120768	281015	0	0	0	F4
1916	506619	83200	0	106878	246677	0	0	25200	F5,O1
1917	764902	72800	191800	340840	302816	0	0	3000	F6,R1,O1
1918	960516	0	402400	448332	288786	15600	0	0	
1919	1145725	1600	14000	420722	437878	0	0	0	
1920	837115	0	21000	242444	448634	0	0	0	R1
1921	181447	0	36600	876895	38307	0	6000	0	F7,R2
1922	424266	0	0	126847	236679	0	0	0	F7,R3,O3
1923	433376	0	1500	15310	234009	0	0	0	R3
1924	799557	0	600	46044	434307	6400	0	0	F7,R2
1925	847913	0	4200	27369	423619	0	0	0	

F1. Fresh : Linear interpolation between : the average of percent of total fresh for each year 1909-11, and the same avearge for 1918-20, times 1338923 lbs fresh product in 1912.
F2. Fresh : Linear interpolation as in F1, times 820956 lbs fresh product in 1913.
F3. Fresh : Linear interpolation as in F1, times 1934733 lbs fresh product in 1914.
F4. Fresh : Linear interpolation as in F1, times 2416603 lbs fresh product in 1915.
F5. Fresh : Linear interpolation as in F1, times 1713848 lbs fresh product in 1916.
F6. Fresh : Linear interpolation as in F1, times 4559785 lbs fresh product in 1917.
F7. Fresh : May include a contribution from outside SE Alaska.
R1. Frozen : May include a contribution from a Seward plant.
R2. Frozen : May include a contribution from outside SE Alaska.
R3. Frozen : May include a contribution from Western Alaska.
D1. D-salt : Does not include an unknown proportion of 100000 lbs "pink & chum" backs in SE.
O1. Other : Pickeled bellies.
O2. Other : Pickeled bellies; does not include a possible proportion of 14000 lbs backs pickled in Alaska.
O3. Other : Does not include a possible proportion of 546250 lbs dried in Alaska.

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year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1926	618397	0	0	25383	572166	5995	0	0	
1927	224433	0	0	9518	290544	1944	0	0	
1928	570219	5600	0	41871	808787	0	0	0	
1929	290797	2400	2300	47638	318679	690	0	0	
1930	283478	0	200	3967	573575	0	0	0	
1931	274248	0	0	168	316289	0	0	262	O4
1932	579443	0	0	0	247909	0	0	76400	O5
1933	424861	9600	0	0	179373	0	0	23100	O5
1934	394212	105600	0	6196	67730	0	0	99700	O6
1935	540948	38400	0	0	237978	0	0	240930	O6
1936	778339	232800	0	43051	771468	0	0	292536	O6
1937	503766	331200	0	14439	645773	0	1440	56142	S1,O6
1938	474453	0	0	635719	636444	0	0	630146	R1,O6
1939	296104	0	2800	8749	497897	0	0	96868	F8,O7
1940	485787	0	0	23373	470702	0	0	208700	R5,O8
1941	319938	0	0	11687	576882	0	0	112306	F9,R6,O9

F8. Fresh   : May include a contribution from a Seward plant.
F9. Fresh   : Linear interpolation.
R5. Frozen : May include a contribution from a Anchorage plant.
R6. Frozen : Average (1940+1942) % frozen times 5977656 lbs frozen in S.E.
S1. Smoked : Kippered.
O4. Frozen : Frozen fillets.
O5. Other : Fresh bait.
O6. Other : Frozen bait.
O7. Other : 72,535 lbs frozen bait & mink feed; 24,383 lbs fresh bait.
O8. Other : 55,478 lbs fresh & frozen bait; 153,222 lbs fresh & frozen feed.
O9. Other : 46120 lbs fresh bait, 66186 lbs fresh & frozen feed.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1942	596181	0	0	0	777442	0	0	223856	R7,10
1943	673692	0	21130	2200	2612512	0	0	71778	R7,011
1944	663508	42900	0	56688	4298020	0	0	25763	O6
1945	266837	90338	3500	37539	4430767	0	0	44930	O6
1946	322620	12375	0	5998	6178162	0	0	3961	O11
1947	257944	0	0	2701	949634	0	390	12198	S1,O5
1948	407393	0	0	0	660184	0	58	2040	O6
1949	243483	0	0	96811	890045	0	5305	40055	O6
1950	500422	0	3000	356	1277064	0	0	300	O6
1951	466334	0	0	0	1522658	0	1160	104856	O6
1952	527960	0	0	111890	875286	0	1527	8432	O6
1953	411860	0	0	0	1029611	0	0	1832	O6
1954	588592	0	0	9945	1103980	0	0	0	
1955	177667	0	0	0	181864	0	0	0	
1956	279732	0	0	0	1704741	0	0	0	
1957	362979	0	0	0	1237068	0	3560	332461	O6
1958	355311	0	0	0	746031	0	0	14880	O6
1959	162948	0	0	0	67168	0	0	26650	O6
1960	112924	0	0	0	718291	0	268	0	R8,S2,O12

R7. Frozen : May include contribution from central Alaska.

R8. Frozen : Linear interpolation between : the average of percent of total frozen for each year 1957-59,
          and the same avearge for 1962-64, times 7645685 lbs frozen product in 1960.

S2. Smoked : Linear interpolation of the smoked products as in F1, times 1449 lbs smoked in SE.

O10. Other : 13920 lbs frozen feed, 209936 lbs fresh & frozen bait.

O11. Other : 35818 lbs frozen steaks+fillets, 35960 lbs fresh & frozen bait.

O12. Other : 320978 lbs frozen bait not allocated to species.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1961	278573	0	0	0	871777	0	711	0	R9,S3,O13
1962	220907	7000	0	83000	1702200	0	440	0	
1963	149254	0	0	0	939910	0	200	0	
1964	217168	0	0	0	1715450	0	950	0	O14
1965	124065	0	0	0	1116007	0	0	0	O15
1966	313160	0	0	564044	3883227	0	1200	0	O16
1967	175818	0	0	0	3315113	0	536	0	FR1,O17
1968	304483	0	0	0	3461930	0	0	0	FR1,O18
1969	32887	0	0	0	1571970	0	0	0	FR1,O19
1970	142472	0	0	160	5915300	0	50	0	O20
1971	159891	0	0	0	2316699	0	0	0	
1972	206265	0	0	54897	7174629	0	0	0	
1973	82358	0	0	114396	9244522	0	0	0	
1974	136247	0	15000	277020	4221308	0	0	0	O21
1975	80947	0	0	0	4573389	0	0	0	FR1
1976	24346	0	0	0	6521962	0	0	0	FR1,O22

FR1. Fsh/Fzn: Fresh and frozen production combined; entire allocated to frozen.
R9. Frozen : Linear interpolation as in F1, times 8109000 lbs frozen product in 1961.
S3. Smoked : Linear interpolation of the smoked products as in F1, times 4300 lbs smoked in SE.
O13. Other : 250100 lbs frozen bait not allocated to species.
O14. Other : 31260 lbs frozen bait not allocated to species.
O15. Other : 640533 lbs frozen bait & 6046 lbs unknown frozen not allocated to species.
O16. Other : 1249352 lbs frozen bait not allocated to species.
O17. Other : 857990 lbs fresh/frozen bait not allocated to species.
O18. Other : 1368016 lbs fresh/frozen bait not allocated to species.
O19. Other : 36527 lbs general and 78192 lbs bait, both fresh/frozen, not allocated to species or products.
O20. Other : 29132 lbs frozen bait not allocated to species.
O21. Other : 13392 lbs unspecified not allocated to species or products.
O22. Other : 48496 lbs whole/dressed fresh/frozen general not allocated to species or products.

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year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1977	14640	0	0	0	3684578	0	0	0	FR1
1978	13414	0	0	0	4539766	0	0	0	FR1
1979	3856	0	0	0	5312000	0	0	0	FR1
1980	39710	0	0	0	8460400	0	0	0	
1981	28188	9000	0	37000	4106000	0	8000	0	C1
1982	17271	0	0	93000	8374000	0	16000	0	
1983	19125	38000	0	324000	6477000	0	0	0	C1
1984	41563	0	0	957000	19920000	0	80000	0	
1985	7104	1000	0	604000	17478000	0	49000	0	C1

Canned production for 1979-1985 calculated from pounds rounded to the nearest 1000 lbs.

C1. M-Cure : An unknown proportion may be pickled .

Appendix A.3. Sockeye salmon products of the Southeast Alaska salmon Industry. One case equals 48 1-lb tins, other product measures are in pounds.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1911	218824	0	600	58560	3225	0	0	0	
1912	250305	0	50400	78178	0	0	0	0	F1
1913	177811	0	13800	46863	0	0	0	0	F2
1914	293997	0	3200	107913	0	11400	0	800	F3,O1
1915	237950	0	0	131635	0	0	0	0	F4
1916	179566	0	11000	91117	11286	0	0	0	F5
1917	204795	4000	10000	236467	36162	1500	0	0	F6,R1
1918	215866	3200	38000	298856	148243	0	0	0	
1919	249218	0	2400	334624	106925	0	0	0	
1920	222181	0	32800	54440	84246	0	0	0	R1
1921	104932	0	97200	273526	50011	0	0	0	F7
1922	133145	0	0	345840	200653	0	0	0	R2,F7,O2
1923	178325	3600	0	38470	0	0	0	0	C1
1924	192507	0	15400	26973	3096	0	0	0	F7,R3
1925	143688	0	200	30059	0	0	0	0	

C1. M-Cure : May include a contribution from outside SE Alaska.
F1. Fresh : Linear interpolation between : the average of percent of total fresh for each year 1909-11,
            and the same avearge for 1918-20, times 1338923 lbs fresh product in 1912.
F2. Fresh : Linear interpolation as in F1, times 820956 lbs fresh product in 1913.
F3. Fresh : Linear interpolation as in F1, times 1934733 lbs fresh product in 1914.
F4. Fresh : Linear interpolation as in F1, times 2416603 lbs fresh product in 1915.
F5. Fresh : Linear interpolation as in F1, times 1713848 lbs fresh product in 1916.
F6. Fresh : Linear interpolation as in F1, times 4559785 lbs fresh product in 1917.
F7. Fresh : May include a contribution from outside SE Alaska.
R1. Frozen : May include a contribution from a Seward plant.
R2. Frozen : May include a contribution from Western Alaska.
R3. Frozen : May include a contribution from outside SE Alaska.
O1. Other : Pickeled bellies; excludes a possible proportion of 2000 lb pickled & 8000 lb smoked backs in Alaska.
O2. Other : Does not include a possible proportion of 209000 lbs dried in Alaska.

Appendix A.3. (p. 2 of 5).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1926	173891	0	0	2990	0	5892	0	0	
1927	116468	0	13600	5160	125	1440	0	0	
1928	106798	0	1400	2958	4540	13800	0	0	
1929	162952	0	26700	26908	60	0	0	0	
1930	221241	0	22000	0	53	0	0	0	
1931	147895	0	14000	21	2491	0	0	0	
1932	138942	0	3000	0	0	0	0	0	
1933	81126	0	8800	0	0	0	0	0	
1934	104398	4800	0	167351	44300	0	0	0	
1935	159429	0	7600	669	0	23800	0	0	F8
1936	218007	0	12400	0	796	7900	0	3906	O3
1937	167744	0	5800	0	0	0	0	0	
1938	192591	0	6600	197745	3928	9870	0	2205	F9,O3
1939	195358	0	2900	610323	0	0	0	0	
1940	125608	0	5000	0	420	0	0	0	
1941	137859	0	4200	0	0	0	0	2100	F10,R4,O4
1942	116511	0	0	0	0	0	0	590	O5
1943	85343	0	0	0	7558	0	0	0	R5
1944	132308	0	0	290596	287005	0	0	0	

F8. Fresh   : One (of 17 total) plants not in SE Alaska.
F9. Fresh   : May include a contribution from a Seward plant.
F10. Fresh   : Assumed equal to 1940.
R4. Frozen : Linear interpolation.
R5. Frozen : May include a contribution from central Alaska.
O3. Other   : Frozen bait.
O4. Other   : Fresh feed.
O5. Other   : Frozen feed.

Appendix A.3.   (p. 3 of 5).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1945	129796	0	0	129639	237874	0	0	0	
1946	58429	0	0	55816	427220	0	0	0	
1947	55905	0	0	194	5036	0	0	0	
1948	39707	0	0	0	2068	0	148	0	
1949	39552	0	0	816	2786	0	0	0	
1950	45874	0	86250	69	33804	0	0	0	
1951	70317	0	0	0	7856	0	0	0	
1952	74510	0	0	8	48	0	0	0	
1953	126569	0	0	0	3387	0	0	0	
1954	112495	0	0	406	54192	0	0	0	
1955	55561	0	0	0	14824	0	0	0	
1956	80855	0	0	0	17078	0	0	0	
1957	82276	0	0	0	442	0	2100	0	
1958	80917	0	0	0	16571	0	0	0	
1959	61702	0	0	0	17570	0	0	0	
1960	44684	0	0	0	139981	0	118	0	R6,S1,O6
1961	66132	0	0	0	285516	0	183	0	R7,S2,O7
1962	62586	0	0	49000	472030	0	60	0	
1963	52014	0	0	0	359030	0	0	0	

R6. Frozen : Linear interpolation between : the average of percent of total frozen for each year 1957-59,
          and the same avearge for 1962-64, times 7645685 lbs frozen product in 1960.
R7. Frozen : Linear interpolation as in F1, times 8109000 lbs frozen product in 1961.
S1. Smoked : Linear interpolation of the smoked products as in F1, times 1449 lbs smoked in SE.
S2. Smoked : Linear interpolation of the smoked products as in F1, times 4300 lbs smoked in SE.
O6. Other : 320978 lbs frozen bait not allocated to species.
O7. Other : 250100 lbs frozen bait not allocated to species.

Appendix A.3. (p. 4 of 5).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1964	70735	0	0	101180	1164400	0	0	0	O8
1965	75013	0	0	0	1117247	0	400	0	O9
1966	76280	0	0	103496	1751566	0	3189	0	O10
1967	64691	0	0	0	1291919	0	772	0	FR1,O11
1968	57385	0	0	0	3368024	0	1225	0	FR1,O12
1969	32197	0	0	0	1772591	0	0	0	FR1,O13
1970	28537	0	0	3511	1429249	0	0	0	O14
1971	41732	0	0	0	977167	0	0	0	
1972	58987	0	0	125213	1409381	0	0	0	
1973	39450	0	0	107	3989873	0	0	0	
1974	56023	0	7019	135198	176475	0	0	0	O15
1975	7167	0	0	0	1791234	0	0	0	FR1
1976	14500	0	0	0	3041387	0	0	0	FR1,O16
1977	27398	0	0	0	3625773	0	0	0	FR1
1978	11553	0	50	0	4646897	0	0	0	FR1
1979	13994	0	0	0	4435800	0	0	0	FR1

Canned production for 1979 calculated from pounds rounded to the nearest 1000 lbs.

FR1. Fsh/Fzn: Fresh and frozen production combined; entire allocated to frozen.

O8.   Other : 31260 lbs frozen bait not allocated to species.

O9.   Other : 640533 lbs frozen bait & 6046 lbs unknown frozen not allocated to species.

O10. Other : 1249352 lbs frozen bait not allocated to species.

O11. Other : 857990 lbs fresh/frozen bait not allocated to species.

O12. Other : 1368016 lbs fresh/frozen bait not allocated to species.

O13. Other : 36527 lbs general and 78192 lbs bait, both fresh/frozen, not allocated to species or products.

O14. Other : 29132 lbs frozen bait not allocated to species.

O15. Other : 13392 lbs unspecified not allocated to species or products.

O16. Other : 48496 lbs whole/dressed fresh/frozen general not allocated to species or products.

Appendix A.3.   (p. 5 of 5).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1980	36079	0	0	47100	2694800	0	500	0	
1981	19813	8000	0	136000	3711000	0	0	0	C1
1982	10708	0	0	172000	6951000	0	1000	0	
1983	23438	13000	0	292000	5662000	0	2000	0	C1
1984	8146	0	0	371000	4820000	0	26000	0	
1985	3396	1000	0	466000	7089000	0	10000	0	C1

Canned production for 1980-1985 calculated from pounds rounded to the nearest 1000 lbs.

C1. M-Cure : An unknown proportion may be pickled .

Appendix A.4. Coho salmon products of the Southeast Alaska salmon Industry. One case equals 48 1-lb tins, other product measures are in pounds.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1918	147324	136800	356800	824810	458858	3000	0	3600	O1
1919	169514	22400	141200	1306698	254784	0	0	0	
1920	111948	0	22000	273020	134134	0	0	0	R1
1921	90802	20800	23000	1593274	379628	0	1311	0	C1,F1
1922	122647	66400	149800	619930	839640	0	0	0	C1,F1,R2, O2
1923	130351	113850	33000	559980	385484	0	0	0	C1,R2
1924	109989	72000	18300	328446	529188	0	0	0	F1,R3
1925	91352	279200	80500	615537	686045	5200	0	0	
1926	96389	738400	24000	672429	1457487	46855	0	0	
1927	114970	1216000	17600	592733	1226591	17545	0	0	
1928	145770	1103200	21200	777074	3845428	4000	10000	0	S1
1929	97847	732800	33150	361465	2160667	0	0	0	
1930	155652	280050	98400	420149	2966539	19200	2160	0	
1931	88455	178000	36400	64495	3017837	7600	0	3674	O3
1932	87038	249600	13200	4554	3883223	0	0	0	
1933	95805	252800	5200	33134	2749987	0	0	200	O4
1934	158527	230400	0	1010754	3930192	0	0		

C1. M-Cure : May include a contribution from outside SE Alaska.
F1. Fresh : May include a contribution from outside SE Alaska.
R1. Frozen : May include a contribution from a Seward plant.
R2. Frozen : May include a contribution from Western Alaska.
R3. Frozen : May include a contribution from outside SE Alaska.
S1. Smoked : Packed in olive oil.
O1. Other : 2000 lbs pickled bellies and 1600 lbs pickled backs.
O2. Other : Does not include a possible proportion of 11750 lbs dried in Alaska.
O3. Other : Frozen fillets.
O4. Other : Fresh bait.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1935	142493	293600	41600	688008	2086540	12300	0	0	F2
1936	134722	264000	91900	1967543	2805468	10200	0	1048	O5
1937	88525	26400	13000	539022	2798169	0	0	3608	O5
1938	143765	793600	3000	1322327	4910565	630	0	9273	O5,R1
1939	66236	119200	17300	1527438	2024898	0	0	120030	F3,O6
1940	156080	260000	4600	1718058	4026233	2800	0	194415	R4,O7
1941	193971	106900	4000	2144030	4124981	0	0	0	F4,R5
1942	177922	23200	0	1239582	4426509	0	0	226171	F5,R6,O8
1943	93534	406808	0	510414	5229017	0	0	12855	R6,O9
1944	88844	728478	0	627694	4221036	0	0	0	
1945	108705	2460951	7400	2114865	8314215	0	0	36	O5
1946	92947	508911	0	761868	7932807	0	0	22104	O5
1947	73542	113850	0	275633	5694090	0	0	1386	O4
1948	159224	240075	0	194058	5091486	0	0	5320	O10
1949	124919	23208	0	793212	6476362	0	0	0	
1950	116344	58825	80300	146091	4437175	0	0	0	

F2. Fresh : One (of 17 total) operations not in SE Alaska.
F3. Fresh : May include a contribution from a Seward plant.
F4. Fresh : (4299747 lbs - linear interp chum lbs)/2; balance is kings.
F5. Fresh : (2484787 lbs - linear interp pink lbs)/2; balance is kings.
R4. Frozen : May include a contribution from a Anchorage plant.
R5. Frozen : Average % (of total SE Ak) frozen in 1940+1942 times 5977656 lbs frozen in S.E.
R6. Frozen : May include a contribution from central Alaska.
O5. Other : Frozen bait.
O6. Other : 117110 lbs frozen steaks+fillets, 2650 lbs frozen bait & mink feed; 270 lbs fresh bait.
O7. Other : 163351 lbs frozen steaks+fillets, 31064 lbs fresh & frozen bait.
O8. Other : 209840 lbs frozen steaks+fillets, 16121 lbs fresh bait, 210 lbs frozen feed.
O9. Other : 2367 lbs frozen steaks+fillets, 10488 lbs lbs fresh bait.
O10. Other : Frozen feed.

Appendix A.4. (p. 3 of 4).

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1951	264393	36741	0	10614	5697920	0	845	0	
1952	122277	0	0	27	3359873	0	995	0	
1953	88261	11885	0	139793	3470150	0	114	0	
1954	84044	381831	0	461916	8013571	0	0	0	
1955	64814	33788	0	0	4153839	0	0	891	O5
1956	44030	7921	0	0	4289377	0	0	0	
1957	53567	84609	0	0	5031445	0	150	0	
1958	50796	315414	0	0	4603662	0	0	0	
1959	60012	86496	0	0	4379580	0	0	0	
1960	19167	188800	0	0	4057146	0	97	0	C2,R7,S2, O11
1961	47361	211200	0	0	4052154	0	536	0	C3,R8,S3, O12
1962	49694	114530	0	30000	5035950	0	260	0	
1963	55261	244460	0	0	5672200	0	600	0	
1964	73992	92420	0	98790	5999490	0	620	0	O13
1965	71744	15270	0	0	5859404	0	236	0	O14
1966	63129	0	0	62519	5089157	0	141	0	O15

C2. M-Cure : Pacific Fisherman Yearbook (1961); may include a contribution from outside SE Alaska.
C3. M-Cure : Pacific Fisherman Yearbook (1962); may include a contribution from outside SE Alaska.
R7. Frozen : Linear interpolation between : the average of percent of total frozen for each year 1957-59,
     and the same avearge for 1962-64, times 7645685 lbs frozen product in 1960.
R8. Frozen : Linear interpolation as in F1, times 8109000 lbs frozen product in 1961.
S2. Smoked : Linear interpolation of the smoked products as in F1, times 1449 lbs smoked in SE.
S3. Smoked : Linear interpolation of the smoked products as in F1, times 4300 lbs smoked in SE.
O11. Other : 320978 lbs frozen bait not allocated to species.
O12. Other : 250100 lbs frozen bait not allocated to species.
O13. Other : 31260 lbs frozen bait not allocated to species.
O14. Other : 640533 lbs frozen bait & 6046 lbs unknown frozen not allocated to species.
O15. Other : 1249352 lbs frozen bait not allocated to species.

year	cases	mild-cure	pickled	fresh	frozen	dry-salt	smoked	other	comments
1967	25526	41775	0	0	5255280	0	546	0	FR1,O16
1968	43829	340612	39360	0	6829611	0	1035	0	FR1,O17
1969	8724	87897	0	0	2694909	0	94	0	FR1,O18
1970	17421	24750	0	71755	3733285	0	0	0	O19
1971	36618	2445	0	656	2915740	0	0	0	
1972	33632	2163	0	66259	6938270	0	0	0	
1973	13252	0	0	161302	4025845	0	0	0	
1974	23260	0	7349	110655	5196179	0	0	0	O20
1975	3728	0	0	0	2238251	0	0	0	FR1
1976	4776	0	0	0	4326482	0	0	0	FR1,O21
1977	4668	0	80	0	5898402	0	0	0	FR1
1978	8385	0	0	0	9978313	0	0	0	FR1
1979	4119	0	0	0	6516700	0	0	0	FR1
1980	9917	0	0	0	5440400	0	0	0	
1981	10271	932000	0	144000	6566000	0	0	0	C4
1982	5146	0	0	1314000	10910000	0	3000	0	
1983	15000	13000	0	785000	10498000	0	0	0	C4
1984	5396	0	0	1038000	11135000	0	3000	0	
1985	2604	0	0	683000	14601000	0	10000	0	

Canned production for 1979-85 calculated from pounds rounded to the nearest 1000 lbs.

C4. M-Cure : An unknown proportion may be pickled .

FR1. Fsh/Fzn: Fresh and frozen production combined; entire allocated to frozen.

O16. Other : 857990 lbs fresh/frozen bait not allocated to species.

O17. Other : 1368016 lbs fresh/frozen bait not allocated to species.

O18. Other : 36527 lbs general and 78192 lbs bait, both fresh/frozen, not allocated to species or products.

O19. Other : 29132 lbs frozen bait not allocated to species.

O20. Other : 13392 lbs unspecified not allocated to species or products.

O21. Other : 48496 lbs whole/dressed fresh/frozen general not allocated to species or products.